V.4"8 TECHNOLOGY

# approach

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THE NAVAL AVIATION SAFETY REVIEW

February 1959

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DETROIT

**IN THIS ISSUE—Once in a Million • Seven Enemies of Survival • One More Time • My Name is Max • Post-Check Havoc**

ON THE COVER

Spectacular moment —the big P5M roars down the bay, sheds her skirt of spray, and gracefully lifts off. APPROACH salutes the men who fly and maintain the boats for their safety record and contribution to freedom of the seas.

Photo courtesy of The Martin Co.


# approach

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## FEBRUARY 1959


Letters ..... 1
Once in a Million ..... 3
Monitor ..... 6
One More Time ..... 8
Anymouse ..... 12
My Name Is Max ..... 16
Keep Your Distance ..... 17
Truth and Consequences ..... 18
Whiz Quiz ..... 23
Notes from Your Flight Surgeon ..... 24
Seven Enemies of Survival ..... 26
Post-Check Havoc ..... 30
Checked and Wrecked ..... 34
Murphy's Law ..... 38
Clipboard ..... 40



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# Letters

## It's an F-5-L

Sir:

My attention has been called to your August article on page 6 by inquiries from the current crop of naval aviators. May I clear up two points:

The reference to the T-5-L in paragraph two, line 4, should have been the F-5-L.

The kite balloon, vintage of 1917-1918, was a small captive balloon used for observation purposes. It was tethered to a winch, some of which were powered by a V-8 engine and some were man-handled by two to four personnel. The cable had in its center a telephone cable core for communication with the ground personnel. The winches were anchored to the deck in the stern of destroyers.

The continual bobbing up and down of the stern of the destroyers on patrol in the Bay of Biscay gave the balloon basket a series of disconcerting jerks that produced more sea-sick ensigns than all the rest of the fleets around the world. At the end of several hours the complexions varied from a ghastly gray to an unbecoming green. Getting in and out of the basket to the deck required the agility of a circus gymnast. If you did not jump at the right moment you could get a broken leg or at least a broken ankle. Great fun when you were young.

C. S. FLIEDNER
Aer-PP-11, BuAer

## Get Axe

Sir:

"The Axe" was given to the best crash crew at Chase Field by the commanding officer of the Beeville base.

Getting "The Axe" in this case, however, was a high honor. "The Axe," a silver fire axe with a white handle, was awarded to the "crash crew of the month" in recognition of their outstanding work, good discipline record and keen spirit.

The award is awarded monthly to the crash crew scoring the highest number of points in personal conduct and professional performance. At the end of a year, a trophy will be presented to the crew that has claimed "The Axe" the most consistently.

Along with "The Axe" goes the honor of flying the "Axe pennant" from the crash trucks while the crew of the month is on duty. The blue pennant wears the white axe symbol.

PIO

## Paint Aids SAR

Sir:

Your recent articles on hardhat colors have interested me considerably, as about a year ago this unit repainted all helicopter crewmembers' hats with blaze orange fluorescent paint, Coast Guard Stock No. CG-8010-G-00-0895 (no Navy number is known). This was done in compliance with Coast Guard Aviation Technical Note 3-57 of May 31, 1957.

Our SAR work involves numerous unscheduled landings to talk directly with people on the scene at accidents, or to make inquiry while on searches. Frequently, comment is made by bystanders about the color, and several times the opening statement of the people contacted has been "I thought you had a fire in the cockpit." Actually, the first thing distinctly seen by an observer, aside from the aircraft itself, is the helmets.

Because of this paint, relocation of crewmen who have been disembarked at the scene of a SAR incident is now quite easy. It seems that the same action would certainly be worthy of consideration from a safety standpoint by any squadron or pilot, as in aircraft incidents away from an airport, probably the biggest delay is in locating the personnel involved.

R. E. LIVINGSTON,
LT, USCGR
CGAS, Miami

**• Please see answer to next letter.**

Sir:

Re: November 1958 issue of APPROACH, in which red reflective, or fluorescent, tape was recommended as a valuable aid to rescue when used on pilots' protective helmets and the article referenced "Crossfeed" number 41 for details on how to obtain a supply of fluorescent paint. I checked the "Crossfeed" referenced but could find no stock numbers or other information concerning paint or tape.

Please supply us with the stock number and method of obtaining this tape from a squadron level.

LTJG R. C. STOVER
Aviation Equipment Officer

**• APPROACH erred in cross referencing "Crossfeed." The tape stock numbers you ask for were listed in the September '58 issue of APPROACH, see "Tape Stock**

**APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.**

Nos." in letters section.

Because reflectorized tape is a new item difficulty may be experienced in procuring it through regular supply channels. Supply will carry only four colors: green, yellow, white and orange, 50-yard rolls, 6" wide, cost $68.00 per roll.

"Scotch Cal," a trade name on the market, is considered superior by some users because it is fluorescent and costs but 30¢ per sq. ft. Purchase on the open market may be your best bet.

Fluorescent paint information is contained in BuAer Instruction NavAer 07.2A Sup-1, dated 2 Oct 1958.

## Quick Pick-Up

Sir:

It is requested that 125 prints of the article, "Quick Pick-Up," which appeared in the November issue of APPROACH, be forwarded to:

U. S. Naval Postgraduate School
General Line and Naval Science School (22)
Monterey, California.

The instructors in the General Line and Naval Science School course in Seamanship feel that this informative and well written article will be of definite value in familiarizing the students, mostly aviators, with the procedures for man overboard recovery.

E. E. YEOMANS
Superintendent

## Landing Clearance

Sir:

The old problem of wheels-up landings has been kicked around ever since retractable landing gears were installed on flying machines. As of this date the problem is unsolved, and I should like to offer my suggestion for further kicking around.

Here's my pitch—Leave the approach clearance authority in the tower but put the landing clearance authority at the end of the runway. Thus clearance for an approach to the runway would be granted by the tower but clearance to actually land on the runway would rest with the wheels watch. This system is in effect aboard ship with Pri-Fly issuing clearance to make an approach and the LSO giving clearance to proceed to a landing.

Granted there would be difficulties in setting up this system relative to equipment, procedures, and personnel (would require additional NAS Operations-qualified aircontrolmen and possibly a pilot runway duty officer) but it would certainly reduce the wheels-up landing rate.

J. L. HOLBROOK
CDR, USN

● **This is controversial, and possibly dangerous. Often the approach end can't even see the other end, or cross traffic of vehicles, late turn offs, wave-offs, etc. Somewhere also we reach a point of diminishing returns where to stop one kind of accident we may create another more serious kind!**

## Ole'

Sir:

Re: "I Object" December 1958 APPROACH by CDR Paul Stevens. I agree 100 percent. An Air Group NINE instruction makes the type approach and landing that Paul describes mandatory in the Group.

Here at Alameda we have repainted the POMOLA with high visibility paint lighted it and moved it from its previous position 800′ down the runway to about 200′-300′ down the runway. We believe that having the same type approach and landing for both the field and the carrier will improve the quality of landings and possibly will prevent some landing accidents.

R. E. REED
Commander
CAG NINE

● See next letter.

Sir:

CDR Paul Stevens' excellent article, "I Object," in the December Approach is an outstanding, professional treatment of a subject for which CDR Stevens is eminently qualified. I agree with his major points wholeheartedly; however, a couple of his comments might be considered more thoroughly.

In order to establish a 3-degree glide slope and 500 ft./min. or less descent a mile out, the straightaway point altitude must be considerably less than 500′. Using 500′ altitude, 6000′ from touchdown, results in a glide slope of 4.8 degrees and a rate of descent of 1000 ft./min. (at 120 knots ground speed). The straightaway point altitude must be 314′ in order to establish a 3-degree glide slope and a descent of 628 ft./min. (at 120 knots, 6000′ from touchdown). I therefore recommend 300′ a mile out for the straightaway point.

JOHN G. CARL
Engineering Officer
BAR, St. Louis

## Plan A Head!

Sir:

Our modern fast jet fighters have done away with the sometime needed relief tube, yet one of our pilots has solved the problem in its absence.

Believing he would never be launched on a "spare," this pilot failed to make the necessary head call before "pilots man your planes" was sounded. Needless to say one of the scheduled aircraft went down and he was launched with his fuel tanks, oil tank and kidneys full.

Painfully at 40,000′ and one hour later this ingenious young lad removed his left boondocker and used it in place of the old faithful relief tube of pre-jet days. His problem wasn't over at this point for 40 minutes later he would have to make a jarring arrested landing with his one boot-full sitting on the deck.

Again showing the quick thinking needed of a naval aviator, he smoothly descended, slowed to 130 knots, gear, flaps and speedbrake DOWN. Opening the canopy to the best desired position, the boot was emptied of all foreign matter. This matter froze upon contact with the plexiglass but soon melted with the flick of the canopy heat switch. The boot was then dried out with a rag and replaced on the owner's foot.

Penetration and landing were uneventful but the story will never be forgotten in our squadron.

FITRON PILOT

# ONCE IN A MILLION

**Safety progress—be it improved design, more training, or more complete procedures—is often vetoed by skeptics who say—"It'll never happen," or "this is clearly an isolated case"! Check this faux pas and decide for yourself.**

THE squadron party was noisy but happy and still in the peaceful stage so the petty officer designated as Shore Patrol had little to do except stay in the background. It was a few minutes after nine at night when he stepped outside the roadhouse.

As the door swung shut the sounds of the party faded and outside there was only the distant murmur of a truck far down the highway. A few shielded white lights and neon signs on the roadhouse and over the motel across the highway added only a dim illumination to that provided by a waning moon. To the north a glow on the horizon marked the city.

In this quiet setting the shore patrol's attention was drawn to a faint whispering in the air. Almost as a reflex action he glanced upward. There, at about the height of the power lines across the highway, he saw the bulk of an airplane approaching head on. For a heart-thumping instant it looked as though the gliding plane would hit the roadhouse but at the last instant the nose lifted slightly. The plane (it was an S2F) skimmed the wires, angled across the roadhouse, and began to settle in an

Continued from preceding page

open field beyond. "It didn't appear to have any power at all from the time I first saw it until it hit the ground," said the shore patrolman.

As soon as the pilot of the aircraft had cleared the roadhouse he set up a wings-level, slightly nose-high attitude. The shore patrolman ran around to the back of the building as the aircraft bellied in. After a jolting, metal-rending travel of some 300 feet across a plowed field the S2F stopped and the pilot secured the cockpit before abandoning through his overhead hatch. He turned the gas selector OFF, pulled the ignition master switch OFF and turned the individual ignition switches. The copilot turned the generator and battery switches OFF. Before the dust had drifted away the shore patrol was put to work guarding the aircraft.

When the cockpit was examined shortly after the accident all controls and switches were appropriately positioned except the mag switches — they were ON. This was puzzling inasmuch as the pilot reported turning the switches OFF after the crash. Then the light dawned. In fact, when the simple reason for the deadstick landing was understood, the dawn came up like thunder. While unfeathering an engine, following a practice feathering, the mag switches had been inadvertently turned OFF and had only been turned ON after the crash when the pilot policed up the cockpit.

First, you might ask about the pilots. Though both had relatively low total hours the man in the left seat had 190 hours in the S2F and was considered an excellent pilot. The copilot on this hop had 175 hours in the S2F with 14 squadron syllabus flights. Both pilots had completed about 18 complete featherings and restarts. Eight of them had been in squadron aircraft. This specific type of accident is extremely rare but it does reinforce the old saying "never take anything for granted." The meaning behind this will become apparent by recreating the actions which led to the crash landing.

After an hour's flight the pilot wanted to get some night landings in and he commenced letting down from 8000 feet. At about 7000 feet the copilot turned off the gas selector for the port engine to give the pilot a practice single engine. The pilot turned the rudder assist on, put props in low pitch, added power on the starboard engine, placed the mixtures in rich and asked the copilot to read over the engine secure check list. Using the challenge and reply system the pilot feathered the port engine and completed the check list. Immediately afterward there was an attempt to restart the port engine.

The copilot read the engine restart check list to the pilot: "Fuel selector — on; starter — twelve blades; aux fuel pump — ON; ignition—BOTH" . . . At this point the pilot mistakenly grasped the *starboard* ignition switch and rotated it counterclockwise to the OFF position!

Securing the starboard engine while it was turning at high power caused a backfire and flash and the pilots, neither of them

## PHILOSOPHY

**There can never be enough written rules to cover every situation that might arise. Common sense, good judgment and experience should take over where the rules end.**

realizing that the starboard mag switches were off, concluded almost simultaneously that the starboard engine had failed. So there they were, gliding with both engines windmilling. Two or three unsuccessful attempts were made to restart the port engine (the one originally feathered).

Each time the "ignition — both" statement was read from the check list both pilots visually checked the setting of the ignition switches and saw them both in the OFF (UP) position, *but the fact that they were in the same position gave the pilots the impression that they were ON!*

"I actually saw the position of the switches," said the copilot, "they were up, but this just didn't register as OFF at the time. I couldn't read the lettering on the ignition switch however."

The pilot had the same thing to say about the mixup. "The copilot called out the starting procedures three times and we both went through it rapidly. Seeing both mags in what appeared to be the ON position, we overlooked our error each time we came to the ignition part of the check list."

Commenting on the use of the check list the squadron commander said, "In the challenge and reply system the control to be checked is to be touched and checked for proper positioning." It is squadron policy for each pilot to carry a flashlight at night . . . to be used in the cockpit in areas of poor or inadequate lighting.

Although the copilot was using his flashlight to read off the check list, he did not use it to check the proper position of the magneto switches. All pilots have again been instructed on the necessity for using flashlights at night as an aid in areas of poor or reduced visibility within the cockpit. ●

When the cockpit was examined after the crash, investigators found an unusual reason for the loss of power.

# monitor

### Reporting of Hazardous Aircraft Air or Ground Operations

Prompt reporting of such incidents since the last meeting of this council has definitely paid off in prompt corrective action being taken and safer flight operation at Iwakuni. It was also reported that forms are now available at the MCAF Operations Duty Desk for reporting of hazardous aircraft air or ground operations. These forms may be either signed or left unsigned by the person making the report.—*Iwakuni*

### Put it on Paper

All squadrons shall make every effort to get on paper the experience of the older qualified pilots in order to pass this information along to the new pilots; repetition of errors is costly.—*ComFAirShip Wing One*

### Quiet, Please!

Members requested the Operations Officer, NAS, to inform tower operators to cease transmissions when pilots are busy during such times as immediately after takeoff, immediately prior to or after landing. It was further requested that tower operators cease using the term "expedite."—*Sub-Area, Brunswick, Maine*

### Flight Clothing Check

It was recommended that units hold inspection of personnel to insure that correct and complete issues of flight clothing equipment are on hand and are being utilized in flight. Particular attention should be placed on the installation of nape straps to helmets and location of the knife.—*El Toro Area, 3rd MAW*

### Three and Thee

The blood has a greater affinity for the carbon monoxide which comes from the incomplete combustion of tobacco than it does for oxygen. A heavy smoker can get as high as 10 percent carbon monoxide blood saturation. It takes only three percent to cause measurable impairment of functions, such as vision and altitude tolerance. Smoking just three cigarettes in a relatively short period before takeoff will reduce your night vision as much as the effects of 8000 feet of altitude. One of the more insidious things about CO poisoning is that a person is subject to sleepiness, reduced mental and physical powers and some loss of vision prior to recognizable symptoms. Like alcohol, carbon monoxide is dispelled from the blood at a very slow rate.—*Northern Area*

EXCERPTS FROM SOME OF THE NAVY'S SAFETY COUNCILS THROUGHOUT THE WORLD, WHO PROVIDE LOCAL LEADERSHIP AND EMPHASIS TO THE NAVAL AVIATION SAFETY PROGRAM.

**Background Info Wanted**

In the interest of obtaining maximum advantages from disassembly inspection reports, it is requested that operating activities provide the cognizant overhaul activity with more background information concerning malfunctioning components submitted for examination.—*NAS Norfolk*

**Refueling Procedure**

The Naval Station will dispatch a fire truck at the same time a gas truck is sent to refuel all WV and P2V aircraft. It will be standard procedure to require a fire truck standing by in front of the aircraft during all refueling operations.—*ComFAir Argentia*

**Skin Damage**

The Chairman of the Maintenance and Material Committee discussed aircraft skin damage to wings. Formerly the wings could be patched, but with the present thin-skinned aircraft the wings must be engineered and re-worked in O&R. One aircraft has been in O&R for several months undergoing repair. It was requested that extreme care be taken with parachutes, tools and wheel chocks by maintenance personnel.—*FAir Alameda*

**Gates Swing Out**

Perimeter fence gates should be constructed to swing outward so that crash equipment can be afforded easy egress during local off-field emergencies.—*ComFAirJap*

**Sound Attenuating Helmets**

Reports indicate that line personnel are still not using these helmets. Audiograms being done here indicate hearing loss is occurring.—*MCAS MIAMI*

**Safety Dividends**

During the past three years the effectiveness of the aviation safety program of MAG-11 has increased along with a great increase in operational requirements using higher performance aircraft. This reflects on each unit commander whose efforts for efficiency have paid these dividends in aircraft saved and preventing injury to personnel with no sacrifice to unit combat readiness. This fine record was attained by sound operating practices, effective maintenance and pilot training procedures and the cooperation of personnel wanting to do a good job. This record can be maintained and improved upon only by continuing the same methods more diligently.—*1st MAW*

# ONE MORE TIME...

BILL SAT dejectedly in the skipper's office fumbling with a paper clip. He worked the clip back and forth and watched the skipper thumb through a pile of papers. The clip snapped apart, and Bill leaned back in his chair and gazed out the window.

Bill was thinking of Scotty, his section leader. The two men had been flying together since Bill had joined the squadron from the training command, and in those six months Scotty had taught him a lot, while becoming a close friend. Bill was now good enough to give Scotty a little competition in bombs and rockets, and there was a standing bet of a beer. But the bet stood no longer—Scotty had been killed that morning.

The aircraft availability had been good during

the deployment and both pilots had been flying their respective airplanes as often as possible. On that particular morning, Bill had been grounded with a head cold, and since Scotty's airplane was in check, he had taken Bill's as an alternate.

Scotty took off on schedule and had a chance to get the feel of things. The air was nice and smooth and it looked like a good day for bullseyes; in fact, Scotty had two 40-footers and a bullseye on his first three runs. The fourth run looked like it was going to be right on the money too. He was right on glide angle, coming in at the right altitude and seemingly ready for a nice smooth recovery. But as the nose approached the horizon, things started to happen. The plane seemed to shudder like a man with a sudden chill, and in the next split second dived toward the ground. The left wing had torn off, trapping Scotty in the cockpit.

As the skipper finished his work and looked up, Bill laid the broken paper clip on the desk and gave the skipper his full attention. Picking up the yellow sheet board for the airplane Scotty had been flying, the skipper briefly but carefully thumbed through the old sheets, and then leaned forward on his desk. "Bill, in looking through these yellow sheets, I've noticed that you reported pulling excessive G five times in the past two weeks. Why so many?"

"Well sir," Bill stirred restlessly, "Scotty and I have been having a little competition of our own, and since he was a pretty good pilot, I guess I was pressing a little close at times to get on target and was a little low when I released." He pulled an imaginary stick. "I just pulled a little too hard trying to stay above the minimum altitude."

"Why didn't you use some of the altitude you had and try to keep within the G limits?"

"Well, you know," Bill explained, "your run is disqualified if you get below minimum altitude."

The skipper's voice lost some of its friendliness, "Didn't it seem a little more important to not over stress the airplane than to avoid being disqualified?"

"Y-yes I guess so sir," Bill stammered, "but at the time it seemed okay. I always reported any excessive G when I returned and the maintenance crew always said the airplane was okay."

"I see." The skipper smiled. "How were you and Scotty doing in your private competition?"

"He was ahead, but he always seemed to get the breaks from the guys calling the hits," Bill explained. "They always seemed to call mine 10 feet further out than they looked to me."

The skipper raised one eyebrow, "Oh? and what brought you to this conclusion?"

"I always check my own hits," Bill answered, "By putting one wing down and looking back just after pulling out."

"Uh huh." The skipper pushed back his chair

SCOTTY

. . . "I've noticed that you reported pulling excessive G five times in the past two weeks. Why so many?"

"I just pulled a little too hard trying to stay above the minimum altitude."

Continued from preceding page

and walked around the desk. "How did you spend your time when you were burning down fuel before starting your bombing practice?" he asked.

"Well, as I said before, Scotty was a real deadeye, so after doing some slow air work, like the schedule called for, I'd make a few practice runs so that I would have the feel of the winds and know if there was going to be any turbulence. I felt this helped out a lot."

"How many G did you pull on these practice runs?"

"Oh, I always stayed within the limits. I never pulled more than six point five."

The skipper reseated himself behind the desk and opened a flight manual. "Let's take a look at this and see how what you've just told me fits in with the operating limitations of the plane we're flying," he said. "First, we know the eight G you reported were too much. The Vn diagram shows that the limit even under the best conditions is six point five G. There should be no need to express the reason for observing these limits. The people who design the airplane put in a safety factor to allow for an occasional inadvertent overstress, but the extra strength was not put there to be used indiscriminately. In fact, all airplanes are subject to fatigue." He picked up a small model airplane, looked at it and then returned it to its place on the desk. "After being overstressed several times, the metal construction of the aircraft finally loses its strength and may fail at a much lower load than that for which it was designed.

"I noticed as you sat there while I finished signing those papers, you were unconsciously bending a paper clip, which finally broke. The thing that caused this was metal fatigue." The skipper picked up a paper clip and began bending it. "Now, as I bend this," he said, "we don't know whether it will break the next time I bend it or not. Maybe the next one will be all it takes." He dropped the paper clip in the waste basket. "Airplanes react in much the same way. If we overstress an airplane excessively, we never know what will happen next time. It may fail, and possibly at a load much less than it's supposedly designed to support. As long as the airplane is not overstressed excessively it should fulfill its service life very nicely, but if it is abused as in the case of the paper clip, it's anyone's guess as to when the failure will occur.

"You say that you have always reported any excessive G that were indicated on the accelerometer. But how about those that weren't reported? For example, you observed your own hits by dropping a wing and looking back. I believe you will find a statement in the manual that limits the airplane to four G during any kind of rolling maneuver."

He took a pack of cigarettes from his pocket and offered one to Bill. The two men lit up, and the skipper continued. "Now if you were pulling more than four G when you looked back at your hit, you were overstressing the aircraft just as surely as you would at eight G. Still you didn't report these."

Bill cleared his throat, "No sir, I didn't realize . . ."

"Actually what happens," the skipper interrupted, "is that one wing must support more than its share of the load. Even though your accelerometer doesn't record it, as far as the wing is concerned it has been overstressed and its life has been shortened." He flicked the ashes from his cigarette. "The bad part about this is that you never really know how much you have overstressed the wing and the aircraft may very possibly be launched again with some drastic damage.

"How about the practice runs you made before getting to the target?" the skipper asked, "Do you have any idea why we burn down fuel before getting on the target?"

"I thought," Bill shrugged, "that it was merely to get the other training that we need."

"That's part of it," the skipper replied, "but there is another reason." He looked at the open flight manual in front of him. "Here in small print under the Vn diagram is a very important piece of information. It says 'The limits set forth in this diagram have been computed for a gross weight of seventeen thousand pounds' and then it goes on to tell how to compute the allowable G for higher gross weights." He carefully extinguished his cigarette. "We spend that extra fifteen minutes flying around not only to get the extra training but to *decrease* the gross weight so that we will be able to pull up to six point five G safely. Again, if your gross weight is too high the weight supported under G loads even below the six point five figure may be in excess of that allowed, consequently, this loading is as critical as the eight G you would report, but since it doesn't show on the accelerometer, it isn't reported."

Bill sat quietly, listening, as the skipper continued. "There is one other item that I noticed you checked, but not because of airplane strength. It was turbulence." He took the flight manual and held it in front of him. "Again the flight manual states, 'when moderate turbulence is encountered, the aircraft should not exceed four point five G even when below the gross weight specified for six point five G.' The obvious reason for this," he explained, "is that if four point five G are being pulled and a two G gust is encountered, then the airplane has been stressed to its maximum

allowable level." He closed the manual and dropped it onto the desk.

"The insidious part of this," he continued, "is that under gust loadings of short duration the accelerometer may not record the maximum load actually experienced. The present accelerometers are made to record fairly long duration loadings and may miss the very short ones. Again the aircraft can be overstressed without any instrument indication and no report.

"In each case I've pointed out an aircraft could be seriously damaged with no indication to the pilot." He turned in his chair, facing Bill, then leaned toward him, "If you knew how many G you had actually pulled, you'd probably be very reluctant to fly that airplane again. The manufacturer puts restrictions on the airplane because he knows just what he has built into it. He feels that he has built his airplane strong enough to do its job, if pilots adhere to the restrictions."

He leaned back in his chair and picked up a part of the broken paper clip. "The part that is grim is that these things are cumulative. Just like the paper clip there are only a few overstresses available. When these are used up the airplane can fail anytime. The pilot who is flying at the time the airplane finally comes apart may be the most conscientious pilot in the world; but if the plane has been abused previously, he may be the loser, not the pilot who did the damage."

"But, sir," Bill had been silent, listening to the skipper, and the sudden loudness of his own voice startled him. He continued, his voice softer, "Don't the visual inspections mechanics give the airplane keep this from happening?"

"In some cases, yes," the skipper answered. "A few years ago the engineers built an airplane with enough extra structure to allow rivets to pop and skin to wrinkle before anything drastic occurred, but today with weight becoming more and more critical, the extra structure has been left out and these indications can no longer be depended upon. A small crack can develop and this will be enough to start a chain reaction that will cause complete failure."

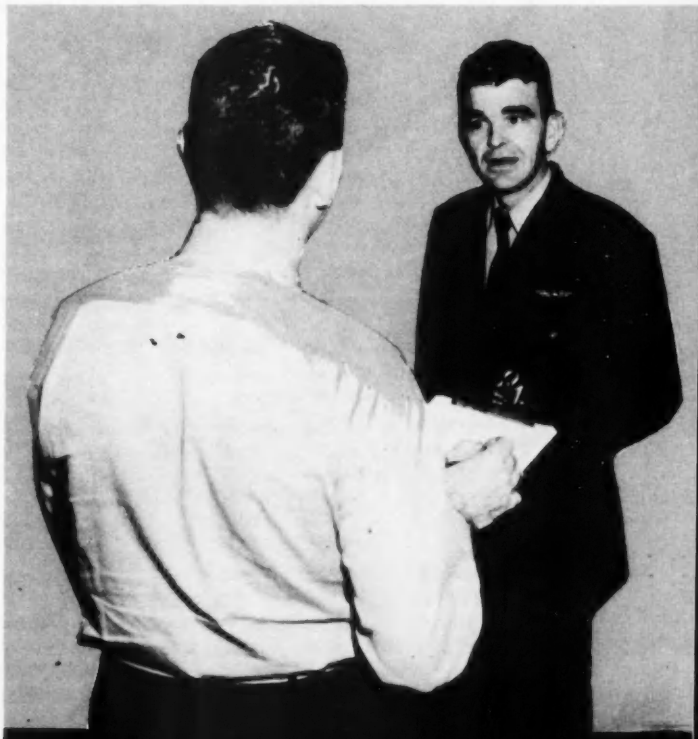
The skipper rose and stood facing Bill. "You could say that each airplane has a specific number of high G maneuvers allowable. If these overstresses are pretty equally distributed through the service life of the aircraft, it will stay together for the whole period and can be flown to retirement. But if the overstresses are all used up early in its service life, the only safe thing to do is either restrict it to fewer G, or take it out of service. In either case, the airplane has lost its combat capability and is useless as far as a weapons platform is concerned." He turned and looked out the window. "We know that to fight our aircraft most effectively we have to fly them right up to the limit of their design. And the point that I want to make here is that we have to know what that limit is, and we have to abide by it. Any way you look at it, the only safe way is to know your aircraft's limits so that you can stay right up close to the good side of the line. If you don't—if you go over the line, something drastic will result, like what happened today."

Bill walked out of the skipper's office with a lot on his mind. Had he actually caused Scotty's death? He hadn't realized it. As he walked back to the readyroom, the schedules officer hailed him.

"Hey, Bill, will you be able to fly in the morning?"

"I guess so, I should be ungrounded this afternoon."

"Okay, I'll schedule you. You'll probably be flying zero eight. I flew it yesterday and pulled seven point five G, but the mechanics checked it and said it was okay."



# STAGGER WING

ON OUR last pre-deployment long-range profile flights in FJ-4Bs, utilizing the buddy tanker, I ended up as a tanker pilot for this particular hop.

Two flights of three were scheduled to takeoff one-half hour apart but due to delays the first flight was a little late. I led our flight to the head of the runway just a few minutes ahead of the second flight.

While taxiing I had gone over the checkoff list and then got takeoff clearance. My acceleration seemed good . . . I had reached 90 knots with about 4500 feet of concrete to go . . . All good, I noted mentally.

Then the radio crackled the command: "Green tanker pull in your speed brakes . . . " The command was actually intended for the *other* tanker but not having heard the word "green" I thought the message was for me. I immediately checked my speed brake indicators. They read IN as I actuated my speedbrake switch to the closed position. No change in indication . . . they seemed to be in . . . but, if they weren't . . . well, I'd never make it off the runway with this maximum load. My calculations already indicated I would use 6200 feet of the 7200 feet available . . . if my takeoff were of optimum performance.

The decision was made. Abort! I didn't have any room for playing around.

**Anonymous reports of flight experiences—By sharing your experience you may save another pilot's life—Send us your Anymouse report.**

After stopping and finding my speedbrakes were O.K. I turned around and taxied back for another takeoff. By now the hop was pretty late. If we were going, it had better be soon to save that much needed precious fuel. I figured I would burn about 400 pounds before the next takeoff attempt.

As I rolled down the runway the second time my scan picked up the runway markers as they flashed by. Airspeed passed knots and was flashing to lift-off speed. I rotated the nose up about 4 degrees and . . . still on the runway!

The 6000-foot marker had just whizzed by. Go to angle of attack, I thought; 13 or 14 units was all I had. I squeezed the units first to 18 then to 19½ . . . bouncing on the runway . . . then I'm airborne as the overrun goes by but the angle of attack registers almost 20 units. This bird stalls out at 21 units.

My engine was giving full power and the airspeed now should be giving me some sort of climb but I was just hanging in the air and I didn't have any altitude to lose, (over saltwater from an airfield altitude of only 14 feet).

After some long seconds my airspeed was almost 200 knots, altitude 250 feet. Time to clean up. I had closed the canopy, raised the gear, and was reaching for the flap handle only to receive the shock of my aviation career. The flaps were *already up*! Somewhere during the aborted takeoff I had pulled them up and never put them back down.

Why had I made it? According to my information, I shouldn't have. Probably the most significant factor was the fuel burned off before the second attempt. Runway temperature was 66° and wind was 11 knots, just about down the runway. The calculated takeoff roll was 6200 feet originally with flaps DOWN. The second should have been 5800 feet (with flaps DOWN) but I used at least 7000 feet.

## $O_2$ CHECK

AT ABOUT 30,000 feet on my second fam hop in the Cougar I began feeling woozy. Naturally my first thought was hypoxia so I checked the blinker. No blinking! The on-off switch was OFF. Within seconds after I turned the oxygen ON and to 100 percent I was feeling normal again and continued the hop.

There are several reasons why a relatively experienced pilot would pull this kind of boner. One: upon entering the aircraft I checked the regulator at NORMAL and figured I'd leave it there 'till just before takeoff and then go to 100 percent. However we were cleared ahead of a couple of other aircraft and in the hurry to get off, I neglected to go to 100 percent. I noticed that just after takeoff but I was having no difficulty breathing, so thought no further about it.

Reason number two: at 15,000 feet, where I was supposed to make an $O_2$ check with the chase pilot, I was having radio trouble so did not notice the oversight there. Three, and most important: the same old story of not relying on the checklist.

Had I used the checklist I would have noticed immediately that the system was not turned on. This experience made a religious believer out of me.

## KNEE BOARD OR HEAD

AS THE saying goes, "There I was at a thousand feet with a cold pipe!" I had just made an afterburner catapult launch in an F3H-2N, cleaned up, came out of burner, and was joining up with my section leader.

He was still in burner accelerating to climb schedule so at 1000 feet, 300 knots, I again put the throttle outboard in the GO position, but instead of getting the usual satisfying feeling of the additional thrust, I got a big "Bang!" I looked down at my instruments and found that my blood wasn't the only thing getting cold.

The RPM was dropping through 85 percent and by the time I could pull the throttle back to IDLE and push it forward again, the TPT and RPM had dropped to around 400° and 70 percent. It was hard to believe but I was finally convinced that my explosive burner light had flamed out my engine.

I put the throttle in CUT-OFF, called the leader, dropped the ram-air hydraulic pump, and started converting that precious speed to altitude. At this point I made the dubious selection of staying with the plane and trying to start it again. By the time I had zoomed to 2500 feet the TPT and RPM

d his hairy tales

were 240° and 20 percent so I hit the igniters, waited for 3 or 4 seconds and eased the throttle forward. The light was normal except the TPT (600° normal) went to 700° but I decided the higher temperature might give me a faster start (prayed I wouldn't get a compressor stall).

The acceleration from 20 up to 40 percent seemed like an eternity; however the RPM was back to 60 percent and coming up fast by the time I descended through 1000 feet.

I started easing back on the stick and ended up at 700 feet, 200 knots as the RPM came back to 100 percent. From there I reported the situation corrected and we continued on with a normal (?) hop, carefully avoiding the use of A/B.

I'd like to bring out the point that all the procedures I used were followed nearly by instinct, and I've decided that Safety Officers who stress emergency procedures continuously should be thanked and admired and not avoided.

In closing I say to those pilots who feel that emergency procedures should be carried on the knee boards and not in the head. If you get into the position I was in, have a nice swim.

► *When something is wrong with the A/B, there is likely to be something wrong with the basic engine. This boy did a good job*—BUT *he should have landed as soon as possible instead of continuing the flight.*—Headmouse

## BEFORE AND AFTER

I HAD a slight stomachache all day but didn't feel it would bother me in the air thus I flew my scheduled hop in the FJ-3M (photo escort for ORI). The hop was routine until returning to the ship to await recovery. While orbiting at 20,000 feet I suddenly felt a wave of nausea and partial blackout with all the symptoms of advanced hypoxia.

Upon recovering control of the aircraft and partial control of myself, meanwhile attempting to rejoin the formation, I checked the oxygen system and pressurization. Both were satisfactory.

My only thought from this time on was to get on deck as soon as possible. I considered declaring an emergency and proceeding directly to the nearest NAS (about 100 miles) but didn't think I could make it before passing out. About then the ship cleared us for landing so I kept my mouth shut and followed the formation on down—still my only thought being to get on deck immediately.

I made one waveoff, one bolter and one very hairy arrestment but don't remember anything about them. I went directly to sick bay where it was discovered that I had a fever of 103°, rising rapidly to 104° as a result of intestinal influenza.

This has taught me one lesson:

Talk to the flight surgeon *before*, not after the hop, whenever you don't feel exactly right.

## EMBARRASSED

THE aftermath of a recent Squadron Maintenance Safety Slogan contest and the implementation of a rigid line and shop safety program had just begun to sink in (so we thought) when somebody goofed.

Upon completion of a two day major inspection on an AD-5, the mechanic, after some electrical difficulty, started a post check turn up. A few seconds after the engine kicked over, the tail raised slightly and the tail wheel collapsed. Cause—the gear handle was in the up position. Aircraft damage—none. Mechanic's pride—strike. Safety officer's confidence—deflated!!!

A comprehensive investigation revealed the following:

1. Main gear safety down locks (stiff-knees) prevented probable main gear collapse and AAR damage.

2. The mechanic who turned-up the aircraft was not the culprit who placed the gear handle in the up position (this mystery remains unsolved).

3. An AD safety feature deenergizes the secondary bus when the gear handle is in the up position. This feature prevents delivery of power to the starter. When attempts to start with both external and internal power failed, the mech called an electrician for assistance.

4. The electrician, after checking circuit breakers and "other" switches, told the mech to try starting in the "Batt. Only" position, thus by-passing the built-in safety feature. The start, unfortunately, was successful, hydraulic pressure started to build, and the tail wheel retracted.

5. Although a drop check of the gear was performed during this check, evidence established that the handle was in the "down" position after the structures check was completed.

6. The technicians and electricians could not have completed their check with the gear handle in the "up" position.

7. At least three people, and possibly as many as six, entered and left the cockpit while the handle was in the "up" position.

## Information Please

A new Anymouse form (anonymous report) will be introduced shortly which will provide more flexibility in reporting not only experiences in aircraft but also auxiliary devices supporting aircraft. It has never been the Naval Aviation Safety Center's intent to restrict this report to pilot experiences although the preponderance of incoming letters indicate the contrary.

There is one field in particular which offers a fertile area in accident prevention; this is in *catapult and arresting gear.* There is a dearth of information on this subject, yet like any mechanism which is subject to the human factor, there must be near-misses and corrective recommendations which can be passed along to others. Anymouse is an excellent avenue for communications in this regard.

Let's hear from all personnel, not just pilots. The mech's or catapult operator's hairy tales can be just as exciting. The wide readership of your Anymouse Report will go far toward instituting corrective action in design if required and toward preventing another person from making the same miscue. Bear in mind the other person's error might not conclude with only a near-miss.

But don't wait for the new form to send in your report. Until the new form is received, please continue to use the old one.

---

From the foregoing we concluded that:

a. Shop personnel have a tendency to check only their own switches prior to applying external power to the aircraft; e.g. ordnance men had not been checking gas, magneto or radio switches, or gear and dive-brake handles. Electricians had not been checking ordnance switches, gear or drive brake handles . . .

b. Some personnel who have cause to use external power or battery power in performing checks or starts were ignorant of basic electrical functions and safety features incorporated in the AD-5.

c. Lack of supervision in training coupled with complacency within our maintenance crew could have been disastrous.

d. To correct the above deficiencies, each shop has been instructed as to the basic functions of all switches and handles in the cockpit, and emphasis has been placed on all safety features incorporated in the aircraft. Interdivisional lectures have been included in the training syllabus to insure against a recurrence of this or a similar incident.

This may or may not be an isolated case. However, had we not used the landing gear safety down locks (stiff-knees), this occurrence would have resulted in an accident.

### THROTTLED

I APPROACHED the field faster than usual (single F8U) and made an otherwise normal break. It was necessary for me to retard the throttle to idle to decelerate in order to lower the gear and raise the wing. It was a slightly fast but otherwise a normal approach; however, at the 90-degree position I tried to advance the throttle to 80% (a good minimum approach setting for this aircraft) and the throttle jammed! Fortunately the approach speed was good, power was not needed, and the result was a normal landing.

Investigation by maintenance showed that the nut on the lower end of the pop-open nozzle clevis bolt was not cotter-keyed, and had backed off. When the throttle was brought to idle the bolt vibrated partially out limiting the movement from idle (64%) to 69%.

A Manufacturer's Malfunction Report states: "If the bolt is installed backward (Murphy's Law) it will cause binding," but, if it is installed properly, without a cotter key the results could be more spectacular!

# 'My name is MAX'

I'M A Lt. (jg) flying F4D-1s in a VF squadron. You think you've heard some pretty hairy ones, huh? Well, grab yourself a cup of coffee, friend, and pull up a chair.

I'm one of those guys who has a pretty high G-tolerance. It takes a lot to knock me out. Lately, our squadron has had some trouble with the D-500 disconnect—the one that the G-suit hose plugs into in an F4D. The D-500 disconnect is so close to your arm that you're liable to unintentionally disconnect it if you're not careful.* Some pilots have even had it come out two or three times on the deck before takeoff. So, all in all, I figured the G-suit was more trouble than it was worth.

So there I was at 40,000 feet—screaming along in a *Skyray*—when all of a sudden there's this big violent shudder and the aircraft begins to slip off on the right wing. Then it goes into a normal spin to the right.

I realize I have entered a high speed stall so I come out of burner and reduce power to idle on the first turn of the spin. The aircraft is in a slow spiral, nose pointing straight down. During the second turn I begin my recovery procedures—I push full left rudder opposite the spin. I'm thinking about where the stick should be when I discover the stick in the full right aft position.

I'll skip the gory details—the stick was locked in the far right aft corner and I couldn't budge it. I tried everything, but the stick wouldn't move and the spiral got flatter and flatter and more violent. I was still working with the stick when I rolled in full nose-down pitch trim with no results so I gave up.

By this time the spin was so tight that the G-forces were pushing my chin down on my chest so hard I couldn't raise my head. I began crawling my hands up my body inching them upward by pulling on objects that protruded from my mae-west and parachute harness — I still couldn't raise my head. After what seemed like an eternity but probably was 10 or 15 seconds, I reached my shoulders. I actually didn't know where I was going from there!

I managed to look upward and, thanks to the powers that be for the direct reading altimeter,—I saw 8000 feet click by and maybe the sight triggered a large shot of adrenalin or maybe the G-forces slacked up just then but, anyway, I was able to work my hands to the face curtain. I pulled the curtain and then just relaxed. I heard an explosion, felt a blast of wind and away I went—must have been doing a turn a second.

To make a long story shorter, my chute opened automatically—a beautiful sight. On the way down I was nauseated and dizzy, couldn't think fast and moved even slower. When I managed to breathe from my bailout oxygen bottle, my head cleared. I hit the water, got out of the chute, broke out my pararaft and inflated it and climbed in. I had seen a ship in the distance as I was coming down so I shot off a smoke flare. A little while later, I was picked up by a small boat from a Coast Guard cutter.

I'm here to tell you from that day to this, as far as I'm concerned, it's been "No G-suit, no go!"

I realize a G-suit can't change the forces of gravity which in this case made it almost fatally impossible for me to raise my arms to pull the face curtain. But the four advantages which the G-suit offers: 1) protection against "greyout," "blackout," and unconsciousness; 2) alleviating fatigue and decreased mental alertness from repeated accelerations below the blackout level; 3) helping relieve leg stiffness and physical tension during flight; and 4) providing an indicating of the acceleration to which the aircraft is being subjected—make plenty of sense to me. My G-suit is my working uniform when I drive a jet.

* BACSEB 9-58 of 3 Oct. 58 establishes a modification of the D-500 disconnect which reduces this possibility.

# Keep Your Distance!

Concerning the factors, other than foreign object damage, which limit aircraft to aircraft taxi distance, the North American Aviation Engineering Propulsion and Environmental Development Group offers the following information.

The maximum inlet operating temperature for the J65-W-4B or -16A engine is 200°F.

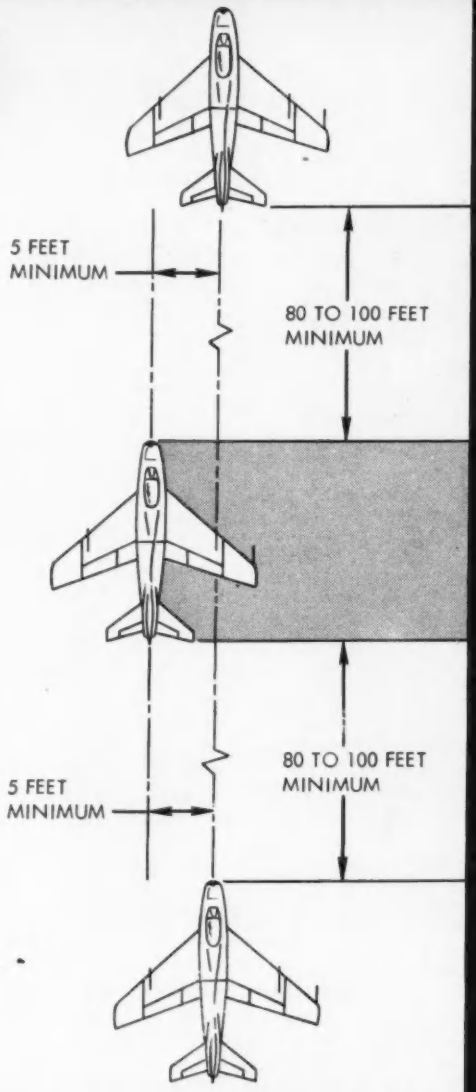
The maximum operating range of the TJ-L2 inlet temperature fuel control sensing system is 140° to 170°F.

With the FJ-3, FJ-4 or FJ-4B airplane at normal taxi attitude of 4 to 7 degrees nose up (ground reference), the exhaust gases will strike the ground and disperse approximately 40 feet behind the tailpipe. If the taxi distance is less than 40 feet and within 5 feet of the lead airplane's thrust centerline, the high temperature exhaust of the lead airplane will be directed into the intake duct of the trail airplane.

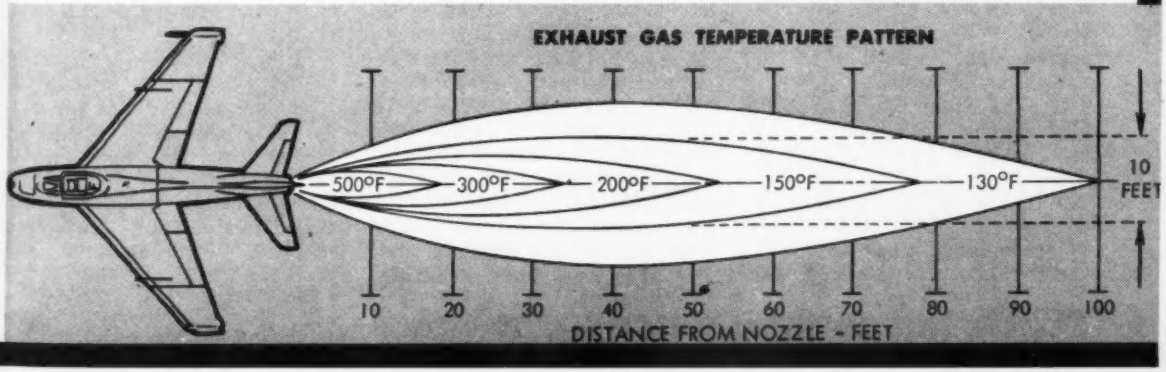
Using the Exhaust Gas Temperature Pattern which shows the airplane in a level attitude and operating at Military Power (see illustration below), the minimum taxi distance is approximately 80 feet. The maximum allowable temperature (for taxi distance consideration) at the nose of a trail airplane is 140°F. (See illustration right.)

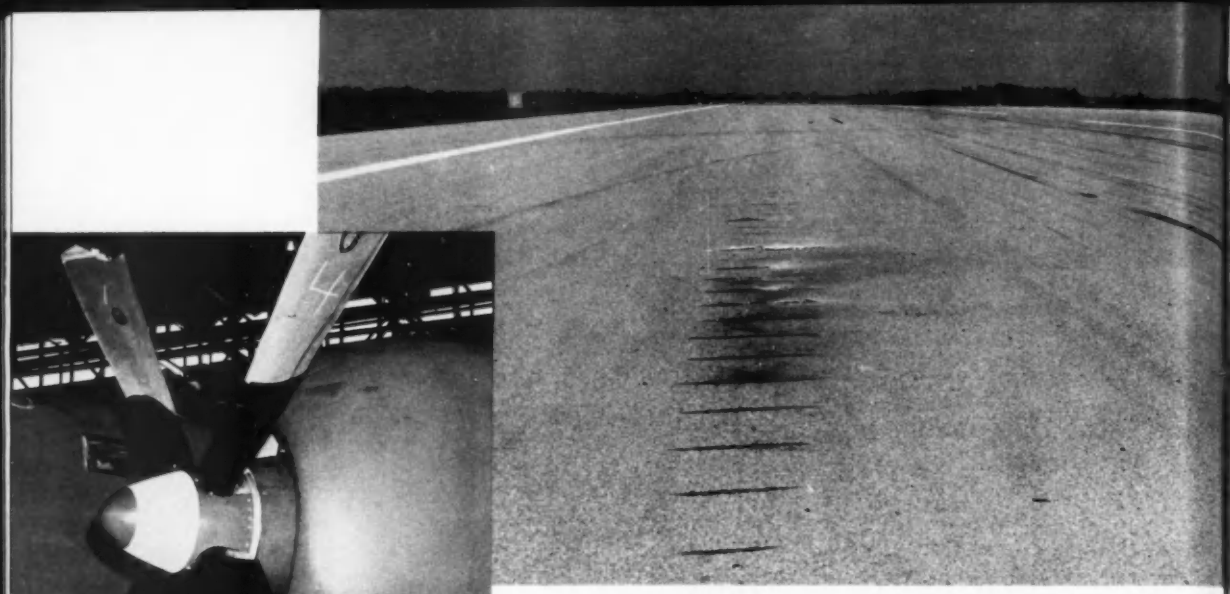
The 140°F temperature cone of the Exhaust Gas Pattern is approximately 10 feet in diameter and extends to a point 80 feet behind the tailpipe.

With all the preceding points considered, NAA Engineering recommends a minimum taxi distance of 80 to 100 feet and the alignment of a trail airplane at least 5 feet from the centerline of thrust of a preceding airplane. In following these recommendations, possible adverse engine operation in a trail airplane will be avoided and the danger of foreign object damage will be held to a minimum.




Courtesy of NAA Service News





A hash-marked runway and (left) chewed propeller tips resulted when the pilots failed to monitor the flight path after a waveoff.

# CROSSED UP

**CROSSED UP**—A junior pilot receiving squadron instruction on a scheduled fam hop in a P2V-7 had made one waveoff and three normal full-flap landings to a full stop. Early in the period the wind had been a 45-degree right crosswind at 14 knots, gusting to 20.

By the time the instructor pilot decided to conduct simulated single-engine landings, as listed in the syllabus, the wind velocity had increased to 20 knots with gusts to 28. The first approach ended in a waveoff due to other traffic and crossing the windline. A second approach was carried to a successful landing.

The third simulated single engine approach (starboard engine pulled back to 17" mp to simulate feathering) resulted in a normal power two-engine waveoff with full flaps after the aircraft suddenly turned to starboard at less than 100 feet altitude. It remained very low throughout the waveoff until the gear was retracted near the upwind end of the runway.

A fourth approach was begun (starboard engine retarded) and full flaps were lowered during the turn on final. Again at a very low altitude and at 100 to 110 knots IAS the P2V-7 suddenly turned to starboard. "I felt the choice was waveoff, or miss the runway," said the student.

"I had pressure on my left rudder which made it seem at least impossible to kick the rudder hard enough to bring the nose around.

"I applied power to the stops and raised the gear. We continued to sink and the left wing dropped, then I heard a noise from the left side."

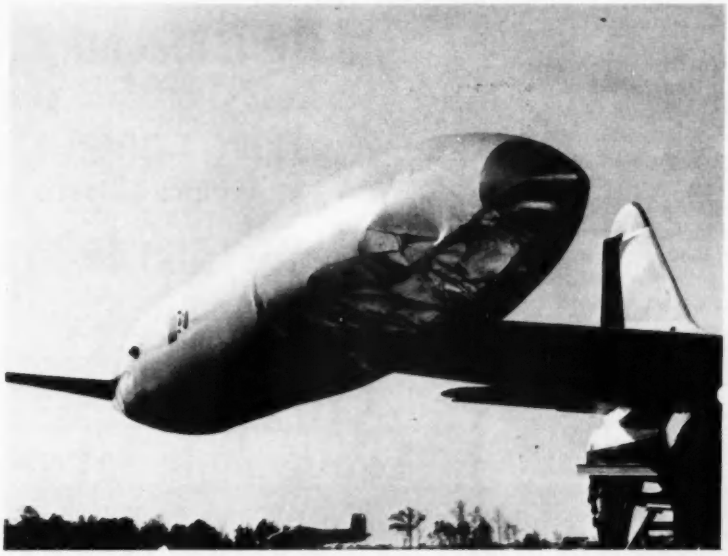
The noise was the port prop tips. They began to strike the runway 1500 feet from the approach end, 45 feet to the right of the center line, and continued to cut the ground for 160 feet until the aircraft gained altitude. Fragments pierced the port side of the fuselage and port tip tank. During the climbout vibration was observed in the port engine. Jet engines were started, the port reciprocating engine secured, and the aircraft made a final landing without further damage.

Propeller blade bite marks prove the aircraft was traveling at 101-103 knots ground speed and with the up-wind component of 14-20 knots, the P2V-7 was flying at 115 knots indicated airspeed and was not in a stalled condition (considering configuration and weight the stall speed would have been about 86 knots).

The sudden swerve to the right at low altitude was caused when the rudder trim tabs were neutralized without the student pilot's knowledge or permission, leading to the waveoff decisions on the last two approaches.

It was felt by the board that the gear was raised at a critically low altitude and both pilots failed to properly monitor the flight path after the gear was coming up. Both pilots were on the controls, said the accident report, and permitted the aircraft to settle onto the runway while carrying full power and flying at 115-123 knots indicated airspeed.

It was felt that the instructor pilot's initial decision to practice single-engine landings under gusty and crosswind conditions was not considered prudent. A change in the squadron syllabus now restricts student pilots in the fam stage from practicing simulated single-engine and crosswind landings whenever the crosswind component is in excess of 10 knots.



When the airspeed dropped below 130 knots the wing dropped and smashed the tip tank.

**TIP TANK TROUBLE**—Forty-five minutes after takeoff on a night IFR flight the pilot of a TV-2 noticed his starboard tip tank was not feeding properly. When the tip tank warning light came ON, he estimated 140 gallons of fuel remained in the starboard tip. Nearing his destination, the pilot was cleared for an en route descent to initial penetration altitude, and he advised approach control, "I have one full tip tank . . . I may drop it. Give me instructions for dropping."

"Standby. We are getting clearance for you to vector from your position to drop your tank."

The clearance was for a radar vector to the designated drop area during penetration, dropping to take place at 5000 feet with further radar vectors bringing the TV-2 back to the penetration pattern. Shortly after reporting inbound out of penetration turn the pilot advised he had 95 gallons. When this was translated into minutes of fuel remaining the radar controller felt it would be better to eliminate the trip to the drop area and make the penetration direct to the field. This pattern would bring the jet across a water area where the tank could be dropped. Agreeing to this, the pilot said, "When I get lower I can give this plane a little more test. I may be able to land with the tank."

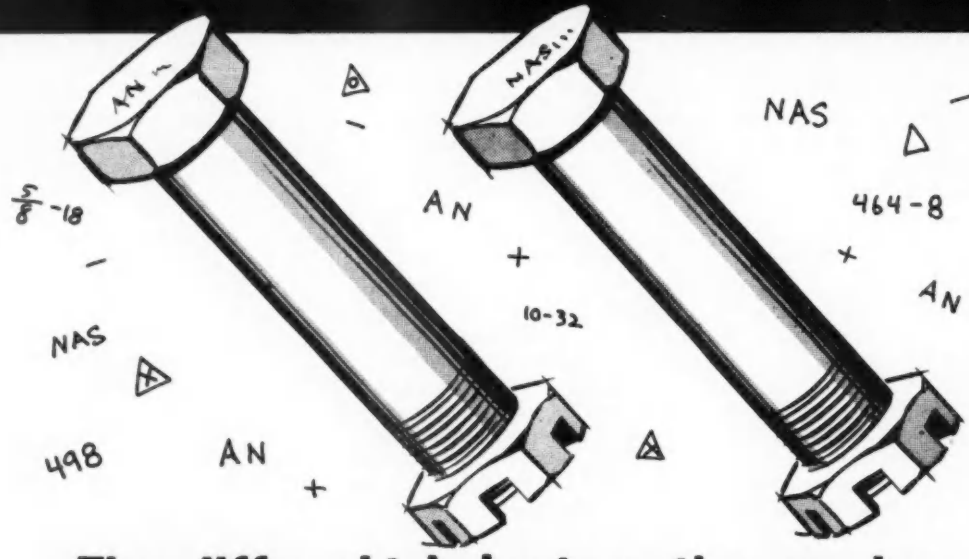
At 8000 feet the TV-2 broke into the clear though it was a moonless night and dark under a broken cloud deck. Wind was 10 knots down the 7000-foot duty runway.

At 180 knots there was good control and with the gear down the pilot noted he was able to hold 150 knots without undue aileron pressure.

"I turned base at 2300 feet," he said, "about two miles from the runway, extending my flaps in the turn. I still was able to hold the right wing up with no trouble. Out of my turn I was lined up perfectly with the run-

Continued on page 22

# They may look alike-but...




## They differ widely in strength, corrosion resistance and ability to withstand temperatures.

## Do YOU know material identification marks?



Courtesy of Flight Safety Foundation Inc.

Most bolts used in aircraft structures are either general purpose AN bolts, or NAS (National Aircraft Standard) internal wrenching, or close tolerance bolts and are marked for identification purposes as required by the applicable standard drawing. These identifying marks are shown on this page. In addition, the bolt manufacturer may include his identification marking on bolt heads.

In certain cases, where dimensional or strength requirements necessitate, aircraft manufacturers are compelled to make up special bolts of different dimensions or higher strength than the standard types. These bolts are made for a particular application and *it is of extreme importance to use like bolts in replacement.* If such bolts are not available, and it is necessary to fabricate them locally, care should be taken to use the identical material and heat treatment specified in the applicable drawings. Otherwise, an authorized substitute material with its proper heat treatment should be used for the structural repair of the aircraft involved.

Such special bolts have the part no. stamped on the head. When the head is too small for stamping the number, the notation "SPL" (abbreviation for special) shall be stamped on the head.—Ref. AN 1-1A-8

Continued from page 19

way and commenced a power-on descent from about 1800 feet; 75-80 percent power maintained my airspeed between 145-150 knots. While on final I had the rear seat pilot call out my airspeed."

One mile from the threshold airspeed was reduced to 140 knots and some pressure was required to hold the wings level. "At no time was this pressure excessive," said the pilot. Passing over the end of the runway at an estimated 10 to 20 feet, the pilot in the rear seat saw 130 knots on the airspeed indicator. About 10 feet off the deck the nose started up for the flare. At the same time the right wing dropped rapidly. Full power, full aileron and maximum rudder failed to bring it up.

Sparks flew as the tip tank hit the ground. The wings leveled momentarily but the right wing dropped again and the jet began arcing to the right, rolling straight after turning 60 degrees from the runway heading.

The accident board quoted a caution note in the emergency section of the flight manual, "Do not in any event allow the aircraft to drop below 130 knots" and said that "it appears that lateral control was lost at a speed of less than 130 knots. Had the pilot maintained a speed of 130 knots or more until touchdown was achieved, it is believed that the landing could have been successfully completed."

Initial touchdown of this jet was 3500 feet down the runway and deceleration was poor; cause was a failure to retard the throttle.

180-degree spot. The duty runway was 8000 feet long, 200 feet wide. Wind was slightly crosswind from the right at 8 knots. After turning final airspeed was reported at 125 knots and prior to touchdown the pilot cut back to IDLE, or so he thought.

The aircraft floated and made initial touchdown about 3500 feet down the runway. Braking action was commenced immediately and both tires began smoking. "I dropped the hook," said the pilot, "hoping to pick up the wire at the 2000-feet-remaining marker." (This had not been rigged as the duty runway had been changed and the rigging crew were occupied with arresting gear on the former active runway.) The port brake faded and a right swerve started after which the emergency brake air bottle was used.

With 2000 feet of hard surface remaining the aircraft went off the right side of the runway, blowing both tires and shearing the starboard main gear as it bumped over the arresting gear chain. Cause of the accident, according to the pilot, was the tight throttle friction lever. "I believe that it was so tight that when I pulled it back to idle, prior to touchdown, it came back to only 50 percent. Consequently, I floated and my braking action was ineffective."

**THROTTLE FRICTION**—During a formation hop the *Cougar* pilot tightened his throttle friction lever because, he said, "I was flying a rather close wing position and like to squeeze the throttle for minimum movement in formation."

Returning to the field the wingman flew a normal pattern with 140 knots and 1000 feet at the

### Mighty Transition

"The main problem encountered by the student is developing the ability to stay ahead of the airplane. The first couple of missions the apprentice is still mentally on the takeoff roll when the airplane reaches climb speed and it is a continuous job to bring him up to and ahead of the aircraft.

"The best training device that we have found to get him leading the airplane is adequate preflight planning with a thorough knowledge of the aircraft and its systems as well as complete flight planning on the ground to include the smallest of details."

*From remarks by LtCol Kenneth R. Rea, commander of a KC-135 jet squadron at Castle AFB, California, who presented a paper on the transition of USAF pilots from propeller driven tankers to the jets to ALPA's 6th Annual Air Safety Forum.*

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# WHEELS-UP SAVES

| Name | Station | Acft | Date |
|---|---|---|---|
| Frederickson, D. H., AC1 | NAS Cecil | A4D-1 | 11-17-58 |
| Foley, J. C., ACT3<br>Shivers, G. L., ACT3 | NAS Miramar | F9F-8P | 11-12-58 |
| Shelton, R. D., AC2<br>Garner, J. W., ACTAN | MCAS Cherry Point | FJ-3 | 11-16-58 |
| Lt. W. E. Nelson | NAS Leeward Point | TV-2 | 9-12-58 |
| Ayers, G. O., AC2 | NAS Oakland | TV | 11-20-58 |
| CPL. R. O. Gaston, USMC | NAS Oceana | FJ-3 | 11-25-58 |

**BOX SCORE**

**Wheels-up landings, unintentional, pilot-induced**

Total number of wheels-up landings Jan to Dec 1957 ..... **31**

Total number of wheels-up landings Jan to Dec 1958 ..... **36**

# WHIZ QUIZ

1. In the lift formula for an airplane wing, lift varies:
   a. directly with velocity
   b. inversely with velocity
   c. directly with velocity squared
   d. inversely with velocity squared

2. The angle of attack of an airfoil is:
   a. the angle between the chord line and the horizontal
   b. the angle between the chord line and the longitudinal axis
   c. the angle between the chord line and the relative wind
   d. the angle between the chord line and the mean camber line

3. Induced drag on airplane is drag due to:
   a. air pressure
   b. frontal area of the airplane
   c. friction of the air on the skin of the plane
   d. development of lift by the airfoil

4. Induced drag increases as:
   a. the airspeed increases
   b. the parasite drag increases
   c. the airspeed decreases
   d. the landing gear is lowered

5. The glide ratio for an airplane is not affected by:
   a. the weight of the airplane
   b. the gliding speed of the airplane
   c. the position of the flaps

6. In a stall, if the center of pressure moves forward of the aerodynamic center of the airfoil, it causes:
   a. progressive stalls
   b. tuck under
   c. pitch up
   d. inverted spins

7. The aspect ratio of a wing is found by:
   a. dividing the chord by the span
   b. dividing the span by the chord
   c. dividing the area of the wing by the chord
   d. multiplying the span by the chord



*See Answers on page 40*

# NOTES FROM YOUR FLIGHT SURGEON

## Blazing AvGas

AFTER ditching an AD5-N in night operations because of materiel failure, the pilot and two crewmen in the water saw the plane guard destroyer heading towards them. When the pilot ignited one of his flares, it "lit with such a blaze that it appeared to have split apart." He doused it under water once and then dove under himself. On surfacing, he found everything ablaze so he went under again and splashed his way clear. Although his hair was singed, he was not burned. Looking back at the fire, he realized that there was avgas floating on the water although he had not smelled or tasted it. He yelled to his crewmen not to light anything.

Using the blaze as a guide, a boat from the DD located the men. When the crew picked the survivors up and were told about the gas, they, in turn, yelled to the men on the ship to put out all cigarets.

The rescue was successful. The survivors experienced only a temporary smarting of the skin due to the avgas in the water.

Should you find yourself in such a situation, remember your flight school swimming training. To escape from an area of water covered with burning fuel, swim under water and splash the burning fuel away when you come up for a breath.

## Stiff Neck

A word to jet pilots not familiar with the recommended procedure of lowering the visor in the APH-5 helmet before pulling the face curtain on the ejection seat . . . In the ejection seat trainer many pilots who pull the face curtain with the helmet visor up find that they catch the face curtain on the helmet visor button and force their heads forward very abruptly. This can result in a stiff neck from the trainer shot. In actual seat ejection from an aircraft, it could result in a more serious spinal injury. Lowering the visor before ejection also gives maximum protection to the face and eyes from damage from windblast.

What is true of the APH-5 visor in this instance is also applicable to the goggles on the H-4 helmet.

## Shrimpboat Acomin'

WEEKLY practice of bail-out procedure and previous training in the bail-out trainer paid off for a student pilot when he experienced an inflight fire in an AD-4 on a dive-bomb-rocket-strafing hop over the Gulf of Mexico.

After several unsuccessful attempts to get out of the smoke-filled cockpit on the right side, he pushed and kicked his way out on the left. He was caught by the slipstream and lifted clear. As his chute opened, he was in a head-up vertical position.

In the abandonment phase, according to the AAR, the pilot acted coolly and properly. So far, so good, but some of the young pilot's subsequent difficulties were of his own making.

After several unsuccessful attempts to get into the parachute harness sling, he had to unbuckle his chest straps. (Later investigation disclosed that his trouble in getting into the sling and trying to unfasten the leg straps had been due to his use of an extra non-

regulation rubber seat cushion for additional comfort.)

He entered the water feet first with his hands on the $CO_2$ toggles of his mae west. As the life vest inflated on one side, he was popped to the surface. The other side of his life vest failed to inflate. Each pilot and crewman should carefully inspect his life vest prior to each flight.

After entry into the water loosened the tension on his leg straps, he was able to unfasten them. The chute spilled and collapsed spontaneously away from him. When he saw fishing boats in the area he decided not to use his PK-2 life raft. Even with only one side inflated, the life vest provided enough buoyancy to keep him afloat. However, failure to use his life raft could have proven unwise; in the words of the AAR, "What may seem very evident to the man in the water may be completely undiscernible to an aircraft or surface vessel."

Rescue took place five minutes after he entered the water—by "civilian shrimp boat"!

## Bubble Trouble

A CREWMEMBER recently bailing out of a disabled AD-5 attributes the loss of his APH-5 helmet to the absence of a nape strap and the presence of chewing gum.

"We were flying along at 12,000 feet," he says. "I was chewing gum inside my oxygen mask which meant my chin strap had to be loose in order for me to move my jaws. When the emergency situation appeared, I took off my mask and spit out my gum. I do not believe I tightened my chin strap afterward. On bailing out, while alongside the body of the aircraft or shortly after passing the body my helmet blew off."

As for the nape strap, the crewmember says he had intended to install it but "as the saying goes 'had never got around to it.'"

A second factor mentioned as a reason for not having the chin strap tight is that he found the nylon webbing of this helmet irritated his chin. On his new helmet, he has corrected this by having a chamois installed over the webbing.

His present helmet also has a nape strap.

Except for the loss of his helmet, the crewmember's bailout was entirely successful.

"The thing that surprised me most about the procedure then and now," he says, "is how clearly all my training for bailout and the experience obtained from talking to other people who had ejected or bailed out aided me at this time."

## Flashlight Cords

THAT flashlight cord looped around your neck could be lethal. Try breaking the Navy-issue cord on your penlight and see for yourself. In the event of an emergency, the cord could strangle you if it hooked on some projection or it could even trap you in your cockpit. Perhaps looping it from the pocket of your flight suit is a solution.

## *Hardhat Testimonial*

**This APH-5 helmet (see photo) recently saved an F9F-6 pilot's life. At an altitude of about 100' on takeoff after a touch and go landing, the pilot heard an explosion and experienced an immediate loss of power. He set the aircraft down again but despite the use of brakes, it continued forward and finally rolled over and stopped in an inverted position, trapping the unhurt pilot in the cockpit. The aircraft caught fire and began to burn.**

**Arriving quickly, crash crews controlled the fire with foam. A crane was brought in to lift the aircraft to free the pilot.**

**As the crane raised the aircraft, the pilot tried to release himself and drop to the ground but he could not free his legs which were pinned in the wreckage. At this point the suspending cables on the crane parted dropping the aircraft. The edge of the cockpit caught the pilot across the side of his head and shoulders and buried him in the foam. No pulse or respiration could be detected at this time. Rescue work was continued, and the pilot, apparently lifeless, was freed about five minutes later. He revived under artificial respiration and was taken to a hospital. The only injuries he suffered were a broken arm and collarbone.**

**His helmet was badly scraped over the visor cover and broken at the points of attachment of the visor cover *(see photo)*. Without the nape strap and tight chin strap it might have come off when the aircraft stopped inverted. The resulting injuries to the pilot would have been fatal.**

**This accident dramatically illustrates the lifesaving qualities of a helmet, properly fitted and equipped with a nape strap and Hardman suspension system or a chin strap properly adjusted.**

# 7 ENEMIES OF S

IN RECENT YEARS many advances have taken place in the development of clothing, equipment, and rations for survival and in the techniques for their use. However, regardless of the quality of the equipment and the techniques for its use, when faced with a survival situation man still has himself to contend with. Man's psychological reactions to the stresses of the survival situation often render him unable to utilize his potential or available resources.

Although knowledge in this field is far from complete, enough has been acquired to throw light and understanding on some of the major psychological factors involved. Much of this knowledge can be termed "common sense" but it must be realized that common sense, itself, is based on past experiences which have led to successful adjustments to various situations and that the inability to apply this common sense, when under stress, has led to the deaths of numerous very able and apparently sensible aircrew.

One of the really significant psychological requirements for survival is the ability to accept, immediately, the reality of any new emergency situation and to react appropriately to it.

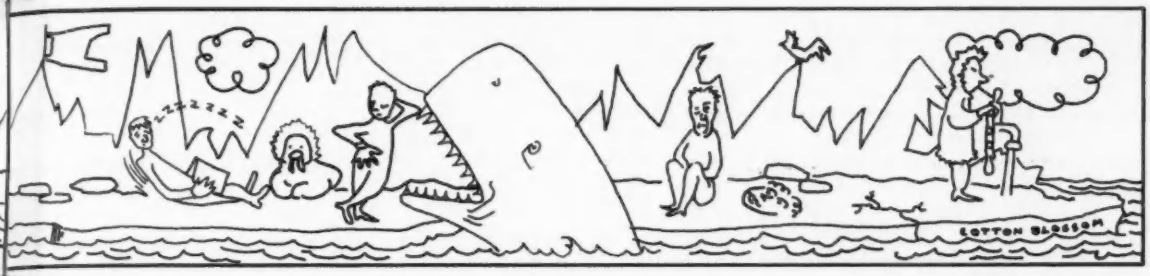
### Major Psychological Factors

Studies conducted at the USAF Advanced Survival School have demonstrated that survival knowledge contributes to the feeling of confidence in one's own ability to survive. Since self-confidence is so important in handling both fear and panic, survival knowledge should serve to minimize fear and to prevent panic.

Training in survival must aim at realism but safeguards must, however, be taken to avoid casualties. Men must sense that they have passed through real danger and have done so unharmed. That such "survival inoculation" training has *permanent* value may be doubtful and from time to time a "booster shot" of survival training may be required to reactivate the value of the original "inoculation."

Fear is a normal and fundamental reaction in any emergency situation which threatens essential needs. Fear influences man's behavior and in consequence his chances for survival. Fear may destroy or on the other hand may improve his chances for survival. There is always something which can be done to improve any survival situation and there is nothing to be gained by avoiding fear through denying the existence of danger.

It is essential that fear in the face of danger be accepted as a perfectly normal reaction rather than be looked upon as a shameful one. This acceptance will lead to purposive action rather than random behaviour and greatly increase the chances for survival. The manner in which the individual reacts to fear will depend rather on himself than on the situation. It is by no means the rule that the physically strong or happy-go-lucky individual will most effectively respond more coolly and effectively under stress than the former and consequently have a better chance for survival. Fear




# SURVIVAL

*By F/O E. M. Beldam*
*RCAF Institute of Aviation Medicine.*

must therefore be recognized, accepted, lived with and if possible put to advantage.

The factors *increasing* fear are most often helplessness and hopelessness. It is reported that some of the factors which most frequently *decrease* or assist in controlling fear are:

(a) having confidence in the survival equipment
(b) having confidence in the technical ability of one's immediate superior or person in command; and
(c) concentrating on the job to be done

### The Enemies

These seven enemies are pain, cold, thirst, hunger, fatigue, boredom and loneliness. Everyone has experienced these at some time but few have known them to a degree where life is threatened. In a survival situation these feelings of pain, cold . . . are in no wise different from those experienced elsewhere except in the degree and danger to life involved. With these feelings, as with fear, the more knowledge you have of their effects on the individual, the more easily will their control be achieved.

***Pain.*** Pain is one of Nature's ways of drawing attention to something that is wrong with the individual but Nature also has ways of holding off pain if the individual is too busily engaged on some other activity to pay heed to the cause of the pain for the time being. In the survival situation, these seven enemies may be held at bay if the individual is wholly occupied with plans for his survival. A special effort must therefore be made to sustain hope and cheerfulness and to keep working for survival. Pain may get the upper-hand, even though it is not serious or prolonged, if it is permitted to do so. If pain is given into, the drive to survive may be fatally weakened.

***Cold.*** Cold is a greater threat to survival than may be realized. It not only lowers the capacity to think rationally but tends to lower the will to do other than get warm again. It is thus an enemy numbing the mind and body and the very will to survive.

***Thirst.*** Even when thirst is not extreme it can dull the mind. Thirst, as with pain and cold can be, however, almost completely ignored if the will to survive is sufficiently strong. It is equally important, however, not to unnecessarily deprive oneself of water since serious dehydration may occur in a survival situation despite there being plenty available water.

***Hunger.*** Hunger, like thirst, is dangerous in the survival situation primarily through decreasing the individual's ability for rational thought. Hunger and thirst also increase susceptibility to the weakening effects of fear, pain and cold.

***Fatigue.*** Since it is usually impossible to avoid some degree of fatigue in the survival situation, it is necessary to understand its effects and thereby make allowances for them. Even a very moderate amount of fatigue can substantially reduce mental ability.

Fatigue can make the individual careless and increasingly prone to develop a feeling of

"just not caring." This is one of the greatest dangers in survival. It is often mistakenly presumed that fatigue and energy expenditure are directly related. This confused belief may be responsible for many deaths in survival situations. There is certainly always a real danger of over-exertion, but fatigue may actually result from hopelessness, from lack of goal orientation, from dissatisfaction, from frustration or from boredom.

Fatigue may represent an escape from a situation which seems to have become too difficult to support. That is why it is so important to understand its nature. If the individual recognizes the dangers of a situation, he can often summon the strength to go on.

*Boredom and Loneliness.* These are two of the toughest enemies of survival because they are unexpected. When nothing is happening, when something anticipated is not realized, when the individual must remain still, quiet and alone, these feelings may be unsupportable and lead to reckless decisions and dangerous activities.

### "Set" for Survival

By "set" is meant a preparatory attitude or state of readiness. In the survival sense it implies being mentally prepared for survival, should the need for survival action arise.

While some "sets" are essential to survival others may greatly endanger the chances of survival. As an example of the latter the mental "set" that "it can't happen to me" can blind one to the reality of the situation and make appropriate reaction in the face of emergency impossible. A "set" which is too strong may also prove dangerous.

Much of the available evidence demonstrates the importance of having a "preparatory set" for whatever emergency may occur. This requires preparation and rehearsal for all emergency possibilities. This may be assisted by survival instruction given through posters, movies and lectures. In this way "preparatory sets" are developed which later may serve as guides to action. Knowledge of the experiences of others may also serve as a "set" for action. It has been found from experience that previous rehearsal, both mental and factual, of emergency procedures may operate as a "set" resulting in automatic action.

The most frequently encountered "set" endangering survival chances is that of "it cannot happen to me." This is the antithesis of the "preparatory set." Failure to have any "set" at all for survival may result in panic even in individuals who, under normal conditions, appear to be extremely calm. The too-strong "set" may also endanger survival since the individual cannot give it up when it is no longer useful.

Knowledge and rehearsal of survival and emergency procedures not only create a feeling of confidence and a "preparatory set" for survival but have been shown to operate even when the survivor is in a state of semi-consciousness during an emergency.

### Group Behavior in Survival

A crew's chances of surviving depend largely on its ability to organize activity. A tight situation does not automatically weld a crew together; rather the more difficult and disordered the situation, the greater are the disorganized crew's problems. This is particularly true in the face of common danger, when fear can result in panic rather than concerted action. High group morale exists when all crew members feel themselves to be part of the crew rather than individuals, and are proud to be members of that crew. High group morale has these advantages:

(a) the individual feels strengthened and protected since he realizes that his survival depends on others whom he trusts

(b) the group can meet failure with greater persistency, and

(c) the group can formulate goals to help each other face the future

High morale must come from internal cohesiveness of the group not merely through external pressures. Under certain conditions, moods and attitudes may become wildly contagious but panic may often be prevented by conscious, well-planned organization and leadership based on the delegation or sharing of responsibility, combined with faith in the group and a realization of the need for cooperation.

### Important Factors in Successful Group Survival

(a) *Organization of manpower.* Organized action, where crew members know what to do and when to do it, both in routine and emergency circumstances is an excellent way of combating panic. An important technique for achieving organized action in survival is to keep the crew well briefed.

(b) *Selective use of personnel.* In well organized groups the individual is allotted the job which most closely fits his personal qualifications.

(c) *Acceptance of suggestions and criticisms.* Although some one person, such as the aircraft commander, must accept responsibility for final decisions, he still can make good use of others' suggestions and criticisms.

(d) *Consideration of available time.* Hundreds of sur-

vival reports indicate that there is rarely unlimited time in which to make decisions. On-the-spot decisions which must be acted upon immediately usually determine survival success.

(e) *Equipment checking.* In more cases than will ever be definitely established, failure to check equipment has presumably resulted in failure to survive.

(f) *Surveying the situation.* The need to survey the situation in problem solving, is widely recognized. Frequently the things most feared are those involving the unknown. Surveying the situation serves to reduce or remove those unknowns and to set in readiness powers of adjustment.

(g) *Understanding instructions.* Investigations have clearly established that the confidence in one's own ability to survive is bolstered by acquiring survival knowledge and know-how.

(h) *Reaction speed.* In survival emergencies, previously established reaction patterns are important in enabling the group to react quickly. One authority claims that one significant object of survival training is to afford an opportunity for knowing and understanding the responses which groups and individuals need to acquire. Well-established patterns of response may operate even in the presence of shock or panic.

## Personality and Survival

Survival may depend more upon individual personality than the degree of danger, the weather, terrain and the nature of the emergency. Whether fear shall lead to panic or act as a spur to greater sharpness, whether fatigue shall overcome the individual or leave him able to take the necessary action to survive, shall to a large extent be more dependent upon the individual than upon the situation.

## Personality Assets in the Survival Situation

(a) *Decisiveness.* The individual's ability to make decisions and act decisively.

(b) *Ingenuity.* The individual's capacity for improvisation through the quality of ingenuity.

(c) *Self-Sufficiency.* Some people cannot bear to be alone, others can fend for themselves, make a good thing out of a bad one and keep their own and others' spirits high.

(d) *Flexibility of Temperament.* The individual must be able to rock with the punch. Some people cannot change themselves, no matter how much their stubbornness costs. Others can readily adjust themselves to the new situation.

(e) *Intrepidity.* The capacity to remain unshaken in the face of adversity and to remain cool and calm when confronted with danger and the unknown.

(f) *Optimism.* To hope for the best, but prepare for the worst.

(g) *Prudence.* To hold one's horses and act only after due thought and deliberation.

(h) *Courage.* To face up to the worst. Few people know how much they can really take but expecting things to be tough or unpleasant helps in preparing to meet the worst that may happen.

(i) *Intuition and Cooperativeness.* The ability to figure out the other man. To be attuned to the individual and group feeling and moods and to size up other people and predict what they are going to do. Equally important to survival is the ability to cooperate with others and to promote harmony and offset discord and strife.

(j) *Personal Insight.* To know the source of one's own special fears and worries so that control over them may be exercised.

## Summary

Much of the information we possess on survival is either common sense or common knowledge but because we have lived with these factors, successfully, under normal conditions we may unfortunately assume that we have nothing new to learn and that we shall respond adequately to their influences when under stress. Nothing is farther from the truth, as the great number of persons who thought they could do so successfully are in too many instances dead. Sound and realistic training in survival is essential as it will provide invaluable conditioning for the real survival situations.

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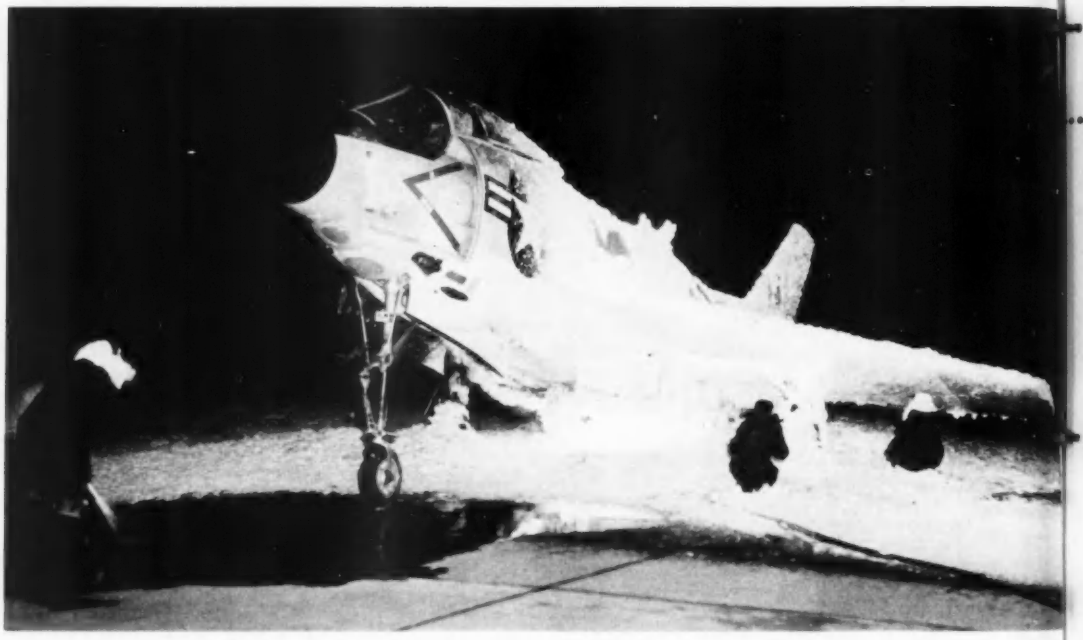
**Sometimes aircraft undergo maintenance and come out the worse for it . . .**



A pair of pliers, misplaced during maintenance were swallowed by this *Demon* on turn-up, caused fire and . . .

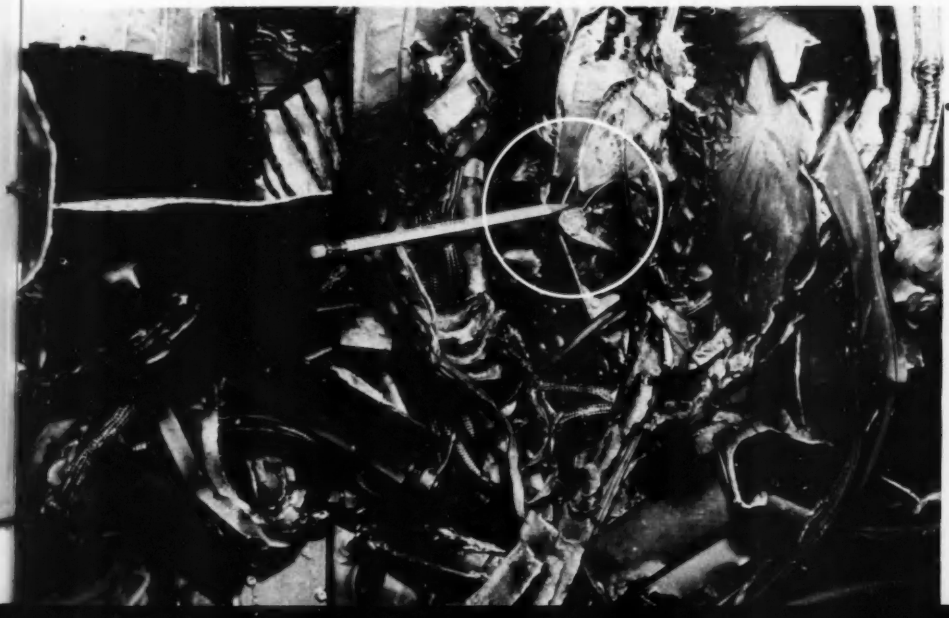
# POST—CHECK HAVOC

A pair of 6-inch needle-nose pliers left in the intake duct by mechanics during maintenance work were ingested by the engine causing STRIKE damage to F3H-2M—cost of the aircraft $1,450,000.00.

The irony of this episode is the fact that such urgency was put on getting the aircraft in an "up" status, after a hydraulic pump failure, that several mechs and field tech reps were required to work almost continuously for a period of 28 hours—only to see the airplane become a heap of scrap, the end result of their efforts.

The accident board noted that fatigue of the men involved was a contributing factor in this accident. It recommended a system of tool accountability be worked out for use when working on jets and a thorough inspection of ducts and intake areas be conducted prior to engine run-up.

. . . an explosion
and finally strike damage
to the aircraft.
The pliers,
circled below, were found
jammed in turbine
section
of the engine.



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# TOOLS and TRASH TEAR UP TURBINES

A RECENT survey of engine Disassembly and Inspection Reports, FLIGAs and AARs received at the Safety Center since 1 January 1958 revealed many *identified* foreign objects induced during maintenance which have been the cause of diverting engines to overhaul. Many of these engines went to overhaul with only a fraction of the operating time utilized. In some cases the engines did not even get into the air!

These *identified* objects reflect on our maintenance personnel—show evidence of improper inspection procedures on preflight and periodic checks, plus representing a large outlay of overhaul funds, added maintenance work and loss of aircraft availability.

A listing of these *identified* objects appears below. This is in addition to the engines being processed through overhaul for *unidentified* FOD. This list is an attempt to show our weak spots in housekeeping and the real necessity for a very close and well supervised inspection of aircraft prior to turn-ups and making them available for flight.

It appears that an increased emphasis on inspection of aircraft is in order for

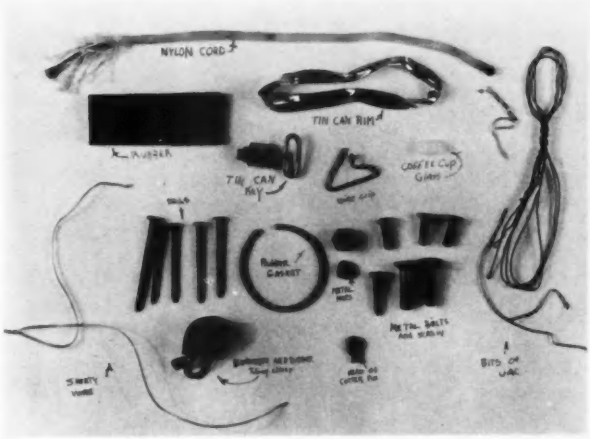
- ► Close inventory of tools by maintenance and line personnel after completion of work.
- ► Gear adrift in inlet ducts.
- ► Faulty safety catches on red warning streamers.
- ► Personal equipment improperly secured to personnel.
- ► Aircraft equipment and doors left loose on the aircraft.
- ► Improperly adjusted battery charging systems.
- ► Duct cover removal.

| CASE OBJECT | REPORT | ENG/ACFT | ENG. HRS. |
|---|---|---|---|
| 1. Bolt | FLIGA | J33/TV | 20.0 |
| 2. Canvas cover | DIR | J33/T2V | 118.0 |
| 3. Flowmeter Bracket | DIR | J33/TV | 486.0 |
| 4. Yankee Screwdriver & Machinists Scribe | DIR | J48/F9F-6 | 531.0 |
| 5. 5/16" Wrench | DIR | J57/F4D | 38.0 |
| 6. Rag | DIR | J57/F8U | 31.5 |
| 7. Metal Object ¾" x ½" Stamped 5179-4-½ | DIR | J57/F8U | 146.5 |
| 8. ⅜" Nut | DIR | J57/F4D | 181.5 |
| 9. Flapper Valve P/N 3542293 | DIR | J57/F4D | 113.3 |
| 10. Crewman's Helmet | FLIGA | J57/F8U | Unknown |
| 11. Crewman's Helmet | FLIGA | J57/F8U | 0.0 |
| 12. Crewman | FLIGA | J57/A3D | 206.0 |
| 13. Duct Cover | FLIGA | J57/F4D | Unknown |
| 14. Duct Cover | FLIGA DIR | J57/F4D | 0.0 |
| 15. Starting Unit Exh. Cone | FLIGA | J57/F4D | Unknown |
| 16. Crewman's Cap | DIR | J57/F8U | 119.9 |
| 17. Rubber/Tape/Paper | DIR | J57/F4D | 48.3 |
| 18. ⅛" Rivet | DIR | J57/F8U | 146.5 |
| 19. Red Rag | DIR | J57/A3D | 74.5 |
| 20. Glove | FLIGA | J57/F8U | Unknown |
| 21. Alum. Tube 3" L. | DIR | J57/F4D | 217.1 |
| 22. Tow Reel | DIR | J57/F4D | 31.9 |
| 23. Rag | DIR | J65/FJ3 | 23.3 |
| 24. Rag | DIR | J65/FJ3 | 62.0 |
| 25. Clamp P/N AN37RM114 | DIR | J65/FJ3 | 112.1 |
| 26. Battery Acid—Explosion | DIR | J65/FJ3 | 107.1 |
| 27. Battery Acid | DIR | J65/FJ3 | 20.4 |
| 28. Battery Acid | DIR | J65/FJ3 | 28.5 |
| 29. Battery Acid—Explosion | DIR | J65/FJ3 | 170.5 |
| 30. Cover Starting Receptacle | FLIGA | J65/F11F | 154.0 |
| 31. Canopy Cover Used As Intake Cover | FLIGA | J65/A4D | Unknown |
| 32. Duct Cover | FLIGA | J65/FJ3 | 137.0 |
| 33. Junction Box Cover | FLIGA | J65/FJ3 | Unknown |
| 34. Duct Cover | AAR | J65/FJ4 | 0.0 |
| 35. Rag | FLIGA | J65/FJ-4B | Unknown |
| 36. Rag | DIR | J65/FJ-3M | 19.1 |
| 37. Duct Cover | DIR | J71/F3H | 263.2 |
| 38. Two Flashlight Batteries | DIR | J71/F3H | 103.4 |
| 39. 1" Open end Wrench | FLIGA | J71/F3H | 93.0 |
| 40. Strap Assembly | FLIGA | J71/F3H | Unknown |
| 41. Duct Cover | FLIGA | J71/F3H | 167.0 |
| 42. Radar Door P/N 25-31175-305 | DIR | J71/F3H | Unknown |

Estimated cost of overhaul on these engines is as follows:

| MODEL ENGINE | QUANTITY | OVERHAUL COST PER ENGINE | TOTAL COST |
|---|---|---|---|
| J33 | 3 | @ $4500.00 | $ 13,500.00 |
| J48 | 1 | @ $6500.00 | $ 6500.00 |
| J57 | 18 | @ $8000.00 | $144,000.00 |
| J65 | 14 | @ $7000.00 | $ 98,000.00 |
| J71 | 6 | @ $9000.00 | $ 54,000.00 |
| | | Grand Total | $316,000.00 |

# PICK-UP PAYOFF




A walk-down of runways, flight decks, and line areas regularly yields foreign objects of this type.

THE safety officer of the USS ESSEX, in his program to eliminate the presence of foreign objects on the flight deck, encountered the type of objects in flight deck pick-ups, shown in the photo above.

These can be grouped as *personal items, maintenance items, ship's maintenance items* and *neglect items.*

*Personal items* are carried by personnel working on the flight deck and consist of such things as keys, cigaret packages and book matches. These items fall out of pockets or are dropped by heedless persons, and may be found either on the flight deck or lodged in aircraft.

*Maintenance items* are the largest offenders. Safety-wire clippings, aircraft screws, stop-nuts, fuses, washers and cotter pins are left by the very people who are called upon to repair or change the engines. Misplaced rags used in cleaning and wiping down aircraft have often been the cause of engine change. The need for good housekeeping by all shops working on aircraft is evident and certainly good housekeeping is the best preventive for the elimination of such debris. Rigorous inspection of the deck by supervisory petty officers after work has been performed is an active step in bringing such practices to the attention of personnel concerned.

*Ship's maintenance items* are deposited in much the same manner as aircraft maintenance items. Debris from ship's welding, wood screws from chocks, deck caulking and nuts and bolts from vehicles used on the flight deck are often found just after work has been completed.

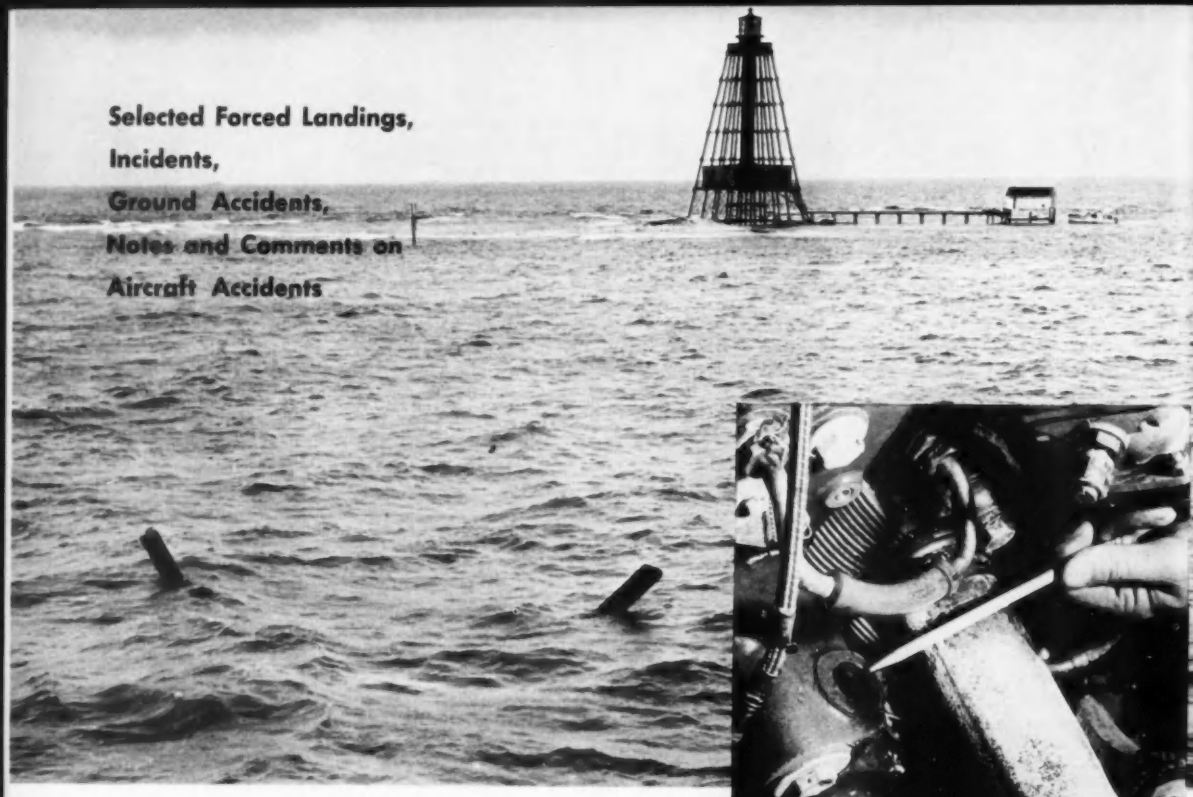
*The lost or neglected items* are as termed; personnel simply do not clean up after themselves of their own accord. How else do flashlight batteries, shackles, and cold chisels find their way up to the flight deck?

Cleanliness is the result of constant attention to detail. Flight deck pick-ups with constant cleaning of pad-eyes, drains and catwalks help to eliminate foreign objects. It is most important that personnel pick up what they drop and clean up the debris that is left when maintenance work is completed. It is deemed feasible that a large vacuum sweeper type of equipment might be utilized to clean up the small hard particles that damage compressor blades.

*For further information on this subject, NASC has an information pamphlet entitled "Aircraft Gas Turbine Engine Foreign Object Damage Protection," which is available upon request.*

**The Chief, Bureau of Aeronautics advises that since establishment of Foreign Object Damage Prevention Programs by the major commands, there has been a significant decline in engine removals due to foreign object damage (FOD). During this period of ever increasing maintenance work load, coupled with the present austerity program, reducing FOD to gas turbine engines is an excellent way of improving fleet readiness.**

**Selected Forced Landings,**
**Incidents,**
**Ground Accidents,**
**Notes and Comments on**
**Aircraft Accidents**



*When the salvaged copter was inspected both sump plugs were missing.*

# CHECKED AND WRECKED

ON TUESDAY the HSS-1 was put through a 30-minute squadron acceptance flight which was satisfactory. Upon completion of the flight a combined acceptance and pre-deployment check was begun.

On Wednesday afternoon the check crew leader, who was also the plane captain of the helicopter, started the power plant section of the check. The magnetic sump plugs from the rear of the engine and the accessory section were removed, inspected, replaced and secured with safety wire. The check crew leader then went on to other parts of the check but when he secured at the end of the normal working hours he forgot to sign off the items he had done.

On Thursday morning the check crew leader told a man who was to assist on the work to check the power plant generally and to specifically check the throttle cables, mixture cables and throttle

box. The check crew leader did not tell the new man what work had already been done on the engine nor did he tell him to look at the check sheet to see what had already been done. The new mechanic believed he was starting a complete power plant check.

After finishing the items specifically mentioned the mech went under the engine and began to work on the oil sump plugs which had already been checked by the check crew leader. He cut the safety wire and loosened the plugs but before he could remove them he was told to leave the job. Other work of higher priority had to be done by the airframe mechs in the same area.

With the plugs loose in the sumps the mech left the aircraft and was immediately assigned work on another plane. Before leaving he signed off the items he had completed but did not tell the check crew leader about the loose plugs. He never did get to come back and complete the work he had started.

By noon on Thursday the check crew leader looked over the check sheets and saw the work on the sump plugs had not been signed off. Remembering that he had personally performed the work, he signed off the job as complete.

The HSS-1 was worked on by the airframe mechs until Friday morning when the engine mechs were able to continue with the power plant and the unfinished items on the check sheet were completed that afternoon. No more attention was given to the sump plugs, now unsafetied and loose, as they were apparently checked and secure.

It was Thursday when the aircraft was signed off by all divisions of the maintenance department and it was moved to the flight line. There, it was preflighted by the plane captain (the same man who was the check crew leader) and placed in an "up" status except for tracking of new rotor blades. After completion of this item the HSS took off and hovered over the mat for about five minutes while the pilot checked control reactions and engine operation. Everything seemed normal so he departed for the operating area to check the sonar equipment. Ten minutes after leaving the mat area the engine began backfiring then quit completely.

Five minutes after the expiration of the local flight plan, having had no contact with the aircraft, the SDO initiated overdue aircraft procedures. About 20 minutes later the pilot telephoned in to report the loss of the helicopter in shallow water.

When the salvaged aircraft was inspected immediately after being swung onto the deck of the "Mary Ann" *both the rear sump plug and accessory section sump plug were missing* and no remnants of safety wire were found near the sumps.

In the ensuing green table sessions, the mechanic helping the plane captain was asked why he was unable to complete the work. He said, "Well, on that day I had the duty and we had night flying, and the metalsmiths told me they wouldn't be done till late. So, I thought while night flying was in progress I would work on the check. But, the aircraft had been put on jacks and I couldn't work on it. The next morning I was put on another job and I didn't remember to tell him. It had slipped my mind."

**FINDING OIL LEAKS**—An oil leak of any kind can be found on an engine by washing down the engine and applying Spot Check in the suspected area. Spot Check is a Magnaflux Corp. product coded SKD-4. It is a white pasty substance and if there is an oil leak underneath it, it shows as a pronounced discoloration of the paste as soon as the engine is run up.—*Air Facts*

**TORQUE WRENCH CHECK**—What is the relation of uncalibrated torque wrenches to aircraft accidents?

The experienced crew chief or his maintenance officer can answer this question without hesitation. But then, why is it that potentially tragic and expensive accidents aren't prevented when the only action required is the proper calibration of these wrenches?

Recent investigation of a serious aircraft engine fire disclosed that hose clamps on a disconnected oil line had been installed with an uncalibrated "T" handle torque wrench. A torque of only 18-inch pounds had been applied, instead of the required 25-inch pounds. This allowed the clamps to loosen and the line to become disconnected.

A full investigation of the incident revealed that very few wrenches of the maintenance activity had been calibrated after issue and that lower grade maintenance personnel were unaware that Technical Order 32B14-3-1-10 also applies to "T" handle torque wrenches. Further check of all such wrenches revealed that 60 percent were out of

Continued from preceding page

tolerance. Senior NCOs concerned were aware that T.O. 32B14-3-1-10 requires calibration of the "T" wrenches but stated that at all bases where they had been stationed the wrenches were not calibrated once they were issued to the individual mechanic.

You can prevent a serious aircraft accident by assuring that "T" and other torque wrenches are calibrated as required. If it hasn't been done recently, it would be a good idea to check the mechanic's tool box, with special emphasis on the current calibration of wrenches.—*TIG Brief*

**REFLECTING TAPE**—While being pushed backward into a hangar deck spot, the port elevator of FJ-3M came into contact with a covered bomb hoist tied down on the deck. The plane director parking the aircraft gave the pilot a late brake signal with contact occurring before the signal.

The occurrence was caused by the plane director's failure to observe the canvas covered bomb hoist in the darkened hangar deck lighting conditions in time to signal a stop.

Similar occurrences might be prevented in the future by putting luminous paint or reflecting tape on hangar deck obstructions of a permanent or semipermanent nature.

**O-RINGS SHOULD NOT BE REUSED**—A recent aircraft crash was caused by an O-ring which had been used twice. An order calling for replacement of an engine oil system part was accomplished without replacing the used O-ring with a new one.

There were no replacement serviceable O-rings available on the base. Bench stock was depleted. Base supply did not have any in stock. Reports in the past disclose maintenance personnel have a tendency to strip bench stock parts and save the parts for future requirements.

At the time there was pressure on field maintenance to get the engine back in commission. The engine shop was reluctant to place the engine on EOCP status.

Sometimes in a similar situation a mechanic will go to the hydraulic shop and pick up an O-ring of comparable size. However, there is always the possibility that the O-ring procured from this source is manufactured from a material that has a limited life expectancy under the conditions to which it will be subjected during engine operation.

As a result this activity had these choices. Place the engine on EOCP, make a trip to the hydraulic ship for a substitute part, or use the old part.

The mechanic chose to use the old O-ring. He had done this before without detrimental results but this time the engine lost its oil supply and the aircraft crashed.

Remember, O-rings are designed and made for a specific job. Use them in their designated location and replace them after use.—*GE Jet Service News*

**HARD STARTING OF NC-5B POWER UNITS**—Some activities have encountered continuous hard starting with new NC-5B Power Units made by Consolidated Diesel Corporation. These units were very difficult to start with the self-starter but would start easily when towed. Initial check of ignition system components revealed no discrepancies.

Further investigation revealed that the Ford engine is designed for positive ground while the NC-5B equipment employs a negative ground. The hard starting problem was solved by reversing the primary leads to the ignition coil.

A Field Service Bulletin put out by Consolidated Diesel Corporation, dated 28 February 1957, states that the battery lead, P/N 2000-3317, should be placed on the DIST terminal of the ignition coil, and the distributor lead, P/N 2000-3315, should be placed on the BATT terminal. This change will be incorporated in all future models at the plant, and it is recommended that this change be made on all models in the field as soon as practicable.—(*NAESU DIGEST*, March 1958)

**FOLLOW-UP INSPECTION**—After having been airborne for one hour, the port engine of an S2F-2 developed a severe oil leak in the vicinity of the propeller governor. An immediate return to base was initiated. As the leak became worse an attempt was made to feather the engine, but the propeller would not go to the feather position. The engine was secured and a descending return made to the nearest suitable facility. The dead engine continued to windmill in high pitch, with normal oil pressure, until landing.

The oil leak was caused by improper tightening of the fitting connecting the port hose assembly, governor to baffle, (part no. R8ZG89P1288-1), to the feathering solenoid on the port governor. During a practice feathering at 4000', the loose fitting backed off until only two threads were engaged.

A meeting of all supervisory maintenance per-

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sonnel was convened to restress the importance of double-checking all routine maintenance. The mechanic concerned has been administered special instruction, and the incident has been widely publicized within the squadron.

Maintenance and supervisory (no follow-up inspection) error is assigned as the primary cause of this forced landing in that the subject fitting was not properly tightened upon completion of a safety of flight inspection.

**BRINELLING**—Some activities are transporting jet engines by ground vehicles using homemade stands which have very little or no provisions for reducing the vibration transmitted to the engine from the moving vehicle. Although this can result in numerous types of damage, the most serious is "Brinelling" of the bearing races, which may lead to bearing failure in a short time.

As a result ComNavAirLant has issued an Instruction (4640.1) which states that no gas turbine engines shall be transported by ground vehicle at speeds greater than 10 miles per hour unless the engine stand/container had adequate shock mounts, springs or pneumatic tires.

**T-BIRD TIP** — Numerous field arresting gear accidents involving TV-2 aircraft result in damage to speed brakes and wheel well doors.

***Causes:*** **Any one, or combination of:**
1. **Improper pilot technique**
2. **Improper pendant rigging**
3. **Improper inflation of tires and/or oleo struts**

***Recommendations:***

► *Pilots:* Raise speed brakes after landing in accordance with landing check list and TV-2 Flight Manual.

Avoid use of brakes when passing over arresting gear wire. With underway application of brakes it is possible to reduce TV-2 ground clearance of MLG fairing from 6 inches to 4½ inches with oleo and tire pressures properly inflated.

► *Facilities:* Relax tension of cross-deck pendants (maximum height of arresting gear wire is 6 inches, ref. Arresting Gear Bulletin No. 7).

► *Mechanics:* Ensure tires struts are inflated to correct pressure and height, respectively (extension and tire inflation varies with airplane weight and oleos). Ref. HMI IT-33A-2.

### From a Fliga Endorsement:

**Inexperience, like ignorance of the law, is not considered to constitute a valid excuse for carelessness and a lack of proper supervision.**

# QUALITY CHECK

DURING a recent Aircraft Maintenance and Material Safety Committee meeting of Marine Aircraft Group 13 the universal problem of good maintenance procedures was discussed. The chairman pointed out many maintenance sections are prone to sacrifice quality workmanship to meet operational schedules. The let-slide-or-wait-until next-check attitude to pick up minor discrepancies is not only poor maintenance procedure but sets up poor training habits for lower rated men. The following items listed are areas where maintenance procedures are often relaxed.

► Improper supervision by NCOs.

► Torque wrenches: Not checked to correct tolerance. Use of memory for correct settings. In some incidents where instructions require a degree of torque, it had not been done.

► Aircraft not maintained in the proper state of cleanliness. Many discrepancies are covered up by this condition.

► Improper use of tools.

► Improper or inadequate lubrication.

► Improper Jet-Cal procedures.

► Use of memory for checks and preflight inspections.

► Inadequate inspection of aircraft after work has been accomplished. Inspection and inspection procedures are the key to good maintenance. Only the most qualified personnel should be assigned as inspectors.

► Corrosion is a never ending problem which requires constant preventive measures particularly in areas where heavy concentration of salt air is present.

Committee members were advised to review their maintenance procedures to insure that none of the above practices exist within their units.

*Which of these procedures needs attention in your outfit?*

# MURPHY'S LAW*

A UF-2G crashed immediately after takeoff on a test flight. Four of the six crew members received fatal injuries. The plane received strike damage.

The plane had just completed an intermediate inspection in which the control columns were removed and inspected for fatigue cracks in the bottom casting.

Rather than relate the entire investigation, only the pertinent findings will be examined here.

*Aileron Controls Rigged in Reverse* — Damage from the fire and necessary damage incurred during rescue operations made it impossible to determine if the aileron cables had been properly or improperly rigged when the control columns were reinstalled during the maintenance inspection. The components were examined by the Accident Board, a CAB Accident Investigator, and by the engineering staff and metallurgical laboratory of the manufacturer. No definite conclusion could be reached.

During the investigation, two mechanics made a careful inspection of the other UFs at this base. They discovered one plane with one full twist in the pilot's column and two half twists in the copilot's control column. (See Figure 1.) This brought about an inspection of all Coast Guard UFs as well as all the planes of this type operated by one of the other services. Seventeen percent of all UF type aircraft belonging to one of the services and 25 percent of all UF type aircraft belonging to the other service had twists in the aileron control cables! In all of these cases the twisted cables still produced the proper aileron movement.

While the Accident Board was not able to determine the cause of this accident, certain items all point strongly toward reversed aileron control cable rigging as the most probable cause. These items are:

(1) The maneuver performed.

(2) Almost conclusive proof that other possible causes of this maneuver were not present in this accident.

(3) The fact that a positive check of proper direction of aileron movement was not made at any time during the inspection.

(4) The extremely high number of rigging errors found in this model of aircraft.

*How Could This Happen?* Figure 1 is a drawing of the UF control column and four different rigging situations. 1(a) shows the column itself. R indicates the sprockets at the elbow of the column. T indicates the step-up sprocket. The cables and chains running from the control wheel to the step-up sprocket form a closed loop. This was the only part of the aileron control system which was disconnected during the inspection.

To remove the control column it is necessary to remove the pulleys S in order to remove the column pivot bolts. This leaves the cables hanging free from the sprockets R. The two cables and the chain that passes around the step-up sprocket have fittings that are interchangeable left for right.

In replacing the columns the pivot bolts must be installed before the pulleys can be placed in position. The cables, hanging free within the control column can easily be twisted. The area between R and S is completely enclosed in the control column. While it can be inspected by means of lights and mirrors, the inspection is a tedious and difficult one. The cables give every indication of being normal and indicate that such an inspection is not necessary. It is impossible to detect any twists by feel or friction.

Figure 1 (b) shows proper rigging. If the cables have a full twist within the column as in 1 (c), the pulleys can be installed, the lower chain connected, and there is no reasonably visible indication of the error. The ailerons move in the proper direction and there is no noticeable friction. The same thing can result with a half twist in the column between R and S and another half twist between S and T. In this case, as shown in 1 (d), the half twist below the pulleys S can be seen by a careful inspection. All of the cases of rigging errors in the 17 percent and 25 percent were of the type shown in 1 (c) and 1 (d) which give proper aileron movement.

* If an aircraft part can be installed incorrectly, someone will install it that way!

If the cables have a half twist in the column and the pulleys S are installed, they hold the half twist. It is then very easy to connect the lower chain and cables with no twists below the pulleys. This is shown in 1 (e). All of the easily visible parts of the control system are properly rigged, but the ailerons move in the wrong direction.

*This is an outstanding example of design error, popularly known as a "Murphy." Two other facts are inescapable. These Murphys are not restricted to the mechanical systems but can be found in the electrical, hydraulic, and all other systems. Also, this type of Murphy is not restricted to the UF. The aviation accident records, both civil and military, show case after case which have been positively identified as reversed control rigging. These cases range from single-engine fighters through twin- and four-engine transports and bombers. The errors have been made at operating bases, overhaul activities, and at the aircraft manufacturing plants. No one person, station, airplane, or manufacturer can be labeled "guilty."*

One thing can, however, be said with certainty. Control systems are one of the systems most susceptible to "Murphys." Not only is the "Murphy" easy to make in the control system, it is also extremely difficult to recognize. Mechanics, supervisors, inspectors, and pilots all can, and have, watched control surface movement and been satisfied that they moved in the right direction—when all they really saw was movement alone.

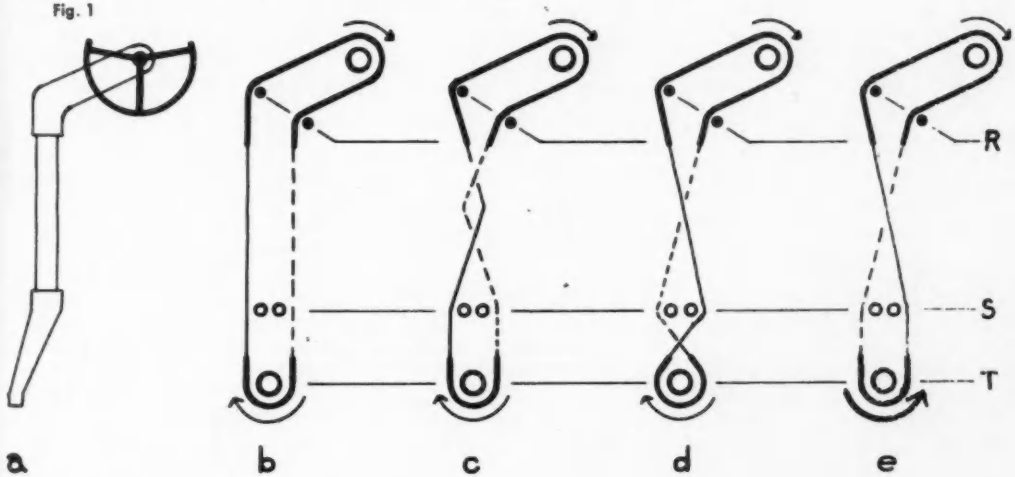
There is no single answer to prevent this type of error. Each person from the maintenance man to the commanding officer is directly involved.

*The Maintenance Man* — must always be suspicious of the airplane and himself. Designers are continuously working to eliminate possibilities of "Murphys" but it will be years, if ever, before they have eliminated all possibilities. The method that seems the logical way of hooking up control or electrical cables, or fuel, oil, and hydraulic lines is often the wrong method. The only way to be sure is to read and follow the HMI religiously. Even this is not enough in some cases. The HMI for the UF does not contain adequate instructions to prevent control rigging errors.

*The Inspector*—must not rely on his knowledge of a mechanic's thoroughness or ability. He must also be suspicious in his inspections. This is not an insult to the mechanic. The outfielder who backs up an infielder in baseball is not insulting the infielder or his ability. He knows that humans occasionally drop the ball. That's the reason for inspectors and that's why outfielders do back up infielders.

*The Supervisor*—must also be suspicious—not so much of the details of the work, that is the inspector's job. The supervisor has to be suspicious of the "routine" maintenance jobs that appear perfectly innocent but that involve primary systems of the aircraft. Sometimes the routine servicing of an aircraft can require disconnecting a major system to get at some minor system. Most of us are familiar with the jet fighter that requires disconnecting the throttle linkage to service the oxygen system. Occasionally the throttle linkage does not get reconnected. This has cost millions of dollars and many lives. The supervisor must carefully examine the routine jobs for such dangers and then establish positive checks to counteract these dangers. He must also make certain that work continuity is maintained. Changing crews in the middle of a maintenance job offers one of the greatest potentials for mistakes.—*USCG Flight Bulletin.* ●

Fig. 1



# Clipboard

## Selecting Alternates

THE FLIGHT PLAN alternate, . . . should never be used automatically because the latest information at the time of diversion may dictate a change of alternate for safer recovery.

Past experience has shown that consideration of certain tricks of the trade with respect to weather has added to safety in aircraft diversion. These factors should be considered in flight planning and again when considering a diversion:

—Favor an alternate downwind because low fuel is almost always a factor, and bucking the jet stream is—actually and psychologically—bad.

—Favor an alternate with surface winds blowing down slope (a lee-side alternate).

—Look for adequate temperature dewpoint spread.

—Seek an alternate where heavy rain showers are not forecast. Aircrew and flight followers should contact radar themselves and check on echo positions and movements.

—Favor an alternate where snow is not forecast.

—Consider runway condition, runway temperature and elevation, and crosswind component.

—Avoid alternates with blowing dust, particularly when the surface wind is blowing from the direction of the rising or setting sun.

—*SAC "Combat Crew."*

## Rough Landing Inspection

OVERWEIGHT and/or rough landings have, for inspection purposes up till now, been considered one and the same thing.

A recent study, comparing overweight and rough landings based on thorough research of the records proved there is a big difference.

When a pilot makes an overweight landing, he is well aware of the situation, prepares for it, uses a little more power and greases the aircraft on with a minimum of shock or stress. Records show no damage occurs with this type of landing, in spite of the load.

But rough landings are something else. We have no record of anyone deliberately planning a rough landing, although there are few pilots who haven't sweated out the chagrin of at least one unavoidable spine buckler. Sometimes they just happen. Naturally, after such a landing occurs, the inspection must be far more searching.

Now the General Maintenance Manual of a major domestic airline differentiates in the inspection requirements between the two conditions. Overweight check requires about 30 to 45 minutes. Rough landing check about 3 to 4 hours. Only the flight crew can judge which it is to be. When they report simply overweight, that's it. When they write it up as rough, it means give the aircraft the works, to find if there are any dislocated vertebrae.—*FSF Aviation Mechanics Bul.*

### WHIZ QUIZ ANSWERS

1. C; 2. C; 3. D; 4. C; 5. A; 6. C; 7. B

This month's Whiz Quiz has no reference listed with the answers. If you miss any of the questions, you should find the subject discussed in your notes from flight training, in many varied books on aeronautics and, if other sources fail, your Aviation Safety Officer's reference material from his ASO course at USC.

## Good Dope

FROM an AAR—" . . . the recommendation that pilots 'be aware of the density altitude before every hop' infers that neither the pilot nor the instructor computed the density altitude, and that they were not aware of this vital factor prior to the flight. There is nothing elsewhere in the report to substantiate such an inference . . . further, the recommendation of the board that 'all instructors follow the training syllabus religiously' infers that the syllabus was not being followed on this flight . . ."

Applied generally, the endorsement is good advice for all accident boards.

There is a common and natural tendency to make general "be kind to animals" type recommendations which, standing alone, are valid and appropriate, but which can be misleading and even damaging when associated with a specific accident.

## Cry Wolf

A RECENT incident points up the necessity and importance of proper checking of equipment settings by ground personnel.

An airborne aircraft requested a parrot check; when he squawked mode two, an entire SAR net was alerted—his gear was rigged to squawk emergency on mode two. Pilot had no way of knowing this, of course. Apparently the station checking his parrot couldn't or didn't act quickly enough to pick up a hot phone and inform others, as considerable searching by aircraft, ships and beach patrols was expended before the facts became known. This isn't likely to happen very often, but scope personnel should be prepared to "clap the lid on the pot" when it does. SAR people look upon every emergency squawk as the real thing, but when false alarms happen too often it's just natural for them to become skeptical.

# WELL DONE!

**LCDR Robert Epperly, of VX-6, for guiding four USAF C-124 Globemasters to a safe landing at a remote Antarctic outpost. When NAF McMurdo Sound was closed by a severe blizzard, LCDR Epperly headed his ski-fitted R4D-8, the Negatus Perspirus, toward Hallett Station, a remote outpost located at the entrance of a box canyon surrounded by 15,000-foot mountains. A veteran of Deep Freeze III, LCDR Epperly was aware of the likely prospect for a safe landing that Hallett offered.**

**After landing without incident, LCDR Epperly was informed that four Globemasters were also being diverted to his location due to the blizzard at McMurdo. Stationing his R4D at the approach end of the canyon, with a few vehicles lined up alongside the landing surface, LCDR Epperly then talked down the first C-124 in a "visual GCA." The three other transports were talked down in the same manner.**

**The next day the Globemasters were refueled by P2V-7 ski Neptunes of VX-6 for the return to McMurdo.**

**For saving the four Globemasters and for heads-up handling of a critical situation, LCDR Epperly was awarded a letter of commendation from RADM George Dufek, Commander, Naval Support Forces, Antarctica.**

**WELL DONE, LCDR Epperly!**

Looking somewhat like a modern-day Robin Hood, LCDR Robert Epperly, right, models Antarctic aviator's warm-weather gear. Above, *Globemasters* are refueled at Hallett Station by VX-6 ski-P2V.

# THE CHIEF SAYS:

**"If every MAINTENANCE MAN will work on aircraft and engines just like he wants the COOK to work on his meals—the DOCTOR on his family—the DENTIST on his teeth—the YEOMAN on his leave requests—and the PAYMASTER on his pay record—the result will be much safer aircraft to fly and fewer fatalities—"**